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LECTURES

ON

THE SURGICAL DISORDERS

OF THE

URINARY ORGANS.

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LECTURES

ON

THE SURGICAL DISORDERS

OF THE

URINARY ORGANS.

BY

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PREFACE TO THE FOURTH EDITION.

The subject-matter included in this volume originally formed portions of successive courses of Lectures on General Clinical Surgery, delivered in my capacity of Surgeon to the Liverpool Royal Infirmary and Lecturer on Clinical Surgery in the Victoria University.

As the last edition has been out of print for some time, opportunity has been taken to thoroughly revise, and to bring up to the latest date, the subjects treated of in this issue. In addition I have incorporated the substance of the Lettsomian Lectures (1888) I had the honour to deliver before the Medical Society of London, which are also out of print, as well as the Lectures before the Royal College of Surgeons (1891), as one of their Hunterian Professors of Pathology and Surgery, which have not hitherto been published.

The illustrations, a full list of which precedes this Preface, have been considerably added to, and a more exhaustive Index of the work is now appended.

I desire to express my warm thanks to my friend, Mr. G. A. Carson, for the great assistance he has rendered me whilst the work was passing through the press.

6 Lower Berkeley Street,
Manchester Square, London,
August, 1893.

FIRST LECTURE.

PRELIMINARY REMARKS—DEFINITION OF STRICTURE—CAUSES—GLEET—THE USE OF INJECTIONS—POSITION, PATHOLOGY AND VARIETIES OF STRICTURE.

GENTLEMEN,—In the Lectures before us, I purpose, as far as it is possible, to bring under notice the more prominent forms of genito-urinary disease. With ample opportunities at my disposal, I hope to be able not only to conduct the course with more regard to system than is usual in clinical lectures, but to let you judge how climate, race, and varied circumstances modify and alter diseases and injuries as we are in this country in the habit of observing them. I cannot lay too much stress on the importance of your taking every legitimate opportunity of practising all manipulations which may be required in the diagnosis and treatment of these diseases. Your future success, so far as this great department of surgery is concerned, is much dependent on the amount of manual skill you can acquire.

The manipulative and operative surgery of the urinary organs can only be very imperfectly acquired on the dead subject. The mere act, for instance, of pushing an instrument up a narrow, curved membranous tube cannot be compared with the delicate manœuvre of passing a catheter on a more or less sensitive man. Of matters such as these, and others that might be mentioned, the dead body teaches us nothing. You have to practise on the living, and from the living you must learn, under the guidance for a time of those who will see that your education is not obtained by the doing

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of anything detrimental to the patient. When this supervision is brought to an end by the decision of the examining boards, you will then be thrown on your own resources.

I shall limit the term "stricture" to the contraction which results from some physical and demonstrable change in the urethral wall, and as I purpose to devote the first part of the course to the consideration of this affection, I will make some general remarks in reference to it. Associated as I have been for many years with hospitals deriving a large number of their patients from seafaring populations, my observation leads me to believe that amongst this class of the community stricture is a common disorder. And that it should be so is not surprising. Gonorrhœa, contracted on shore in the debauch that frequently precedes a vessel's departure for some foreign port, breaks out two or three days afterwards. Treatment, except in ships carrying passengers—and sometimes even in these—is usually conducted by the captain or the mate, and not always, as might be anticipated, with advantage to the patient. The old notion that every disorder consequent on promiscuous intercourse is "venereal," and must be treated by mercury, still prevails, and large doses of calomel, until profuse salivation is produced, is not rarely the only remedy administered for a gonorrhœal discharge. Some of the worst cases of stricture have been occasioned, under similar circumstances, by resort to most primitive means for the relief of retention of urine. In the absence of catheters from the ship's medicine-chest, or still more frequently, as I have found, on account of their faultiness, I have known instances where the wire from a soda-water bottle and an iron skewer have each done duty in "forcing" a stricture. A bougie made from an old clock-pendulum was recently shown me by a sailor, as an instrument modelled by himself with which he had successfully combated an obstinate stricture, that had previously resisted the attacks made on it with a gum-elastic catheter. It is not a long time ago that a man was admitted with retention, and a badly lacerated urethra, as a consequence of an attempt on the part of the mate of his ship to reach the bladder by the aid of a pointed piece of wood, roughly adapted to the shape of a bougie. Here the operator was more than professionally interested, inasmuch as he had occasioned the retention by kicking the patient behind the scrotum. The most remarkable piece of ingenuity of the kind that I can remember was where, after a patient had endured the unspeakable agonies of retention for over three days, an endeavour had been made to introduce through the urethra a piece of gas-piping, which had been devised, *in extremis*, for the purpose by the engineer of the ship. Unfortunately, however, this failed to effect its object. When I saw the patient the urethra was much lacerated, and it was with difficulty that I introduced a catheter, and removed a large quantity of most fetid urine. Relief, however, came too late, the man dying shortly after his arrival, with convulsions and urinary poisoning.

Then, again, we have strictures resulting from the healing of sores, of wounds, and of lacerations of the urethra; in the last named we include what are described as traumatic strictures. Let me take a few illustrations. A patient has a sore on his glans penis, involving the meatus. When the sore heals a cicatrix is left. All scars or cicatrices are prone to contract, and thus to cause a narrowing of the urethral orifice. This condition was well illustrated in a patient where the same state of things was brought about by an improperly performed operation of circumcision, a portion of the glans penis having been removed as well as the prepuce. When the sore healed, the cicatrix contracted, and the patient presented himself with a tight stricture of the meatus requiring division. Blows on the perinæum are a frequent cause of stricture amongst our sailor population. A man falls from aloft, across a spar or a rope, and ruptures his urethra. If the patient recover from the immediate effects of the injury, it is with his urethra scarred. This is the worst variety of stricture—traumatic—a form of the disorder more obstinate to deal with than any other. Traumatic stricture may be caused by violence from within, as in crushing of the pelvis, when the fractured pubic bone pierces or lacerates the urethra. Here we have, for the most part, jagged and uneven wounds, not rarely complicated with extravasation of urine—a condition of things unfavourable to accurate or kindly repair. Injuries occasioned in this way are invariably followed by a dense stricture, and in this respect are a contrast to the clean-cut wounds of lithotomy, where the occurrence of stricture is exceedingly rare.

From these illustrations it is obvious that the causes of stricture are various. The greater proportion of patients attribute their misfortune, directly or indirectly, to previous attacks of gonorrhœa. Those who do so *directly* are disposed to regard the stricture as the natural consequence of their previous mishap. Those who do so *indirectly*, usually have something to say about the treatment employed and its bearing upon the subsequent formation of a stricture. It is worth our while, for a moment, to analyse the statements made by the latter class, with the view of ascertaining how far their allegations hold good. "I was almost cured of my gonorrhœa, only a very slight discharge remaining, which I thought would go away of itself," is the statement of the patient who is convicted of his own indiscretion in having allowed things to go on from bad to worse. Others, again, seek refuge in referring their misfortune to the improper advice they have received. "I was told that it was only a gleet, due to weakness, which would go away by iron, tonics, and cold baths." Here we have illustrations of gleet terminating in stricture.

Now, it is well to understand that a gleet is not a disorder which is disposed to go away of itself; on the contrary, it requires careful and well-considered treatment, and if it does not receive this—that is to say, if it is clumsily dealt with, or not dealt with at all—it probably ends in the formation of a stricture.

A gleet* is to be regarded as indicative of the early formation of stricture. Nay, further, you will not do wrongly in regarding a gleet as the stage in the stricture-forming process when, by your treatment, you can promise your patient to restore his urethra to its normal condition. When a stricture is once allowed to become cicatricial in its character, you may palliate or adapt, but you can no more *restore* his urethra than you can, by dissection or any other process, remove a scar from his skin. You may lessen the inconveniences of a scar, but you cannot obliterate it. Let not, then, the curable stage of stricture pass by; at all events, let the onus of doing so rest with your patient, and not yourself.

Again, it is very common to hear patients attribute their strictures to the use of injections in the treatment of their gonorrhœas. A considerable amount of prejudice exists in the public mind in reference to the use of these applications. Patients not unfrequently say, when consulting you about a gonorrhœa, "Do not order me an injection, as I understand these remedies often occasion stricture." Is there any truth in such an allegation? Assuredly not, presuming, of course, injections are judiciously prescribed and properly used.

Let me remind you that the cure of gonorrhœa by specifics is essentially one on the principle of injection. For how do the drugs that act specifically on the urethra effect their purpose? How do we explain the action of copaiba, oil of sandal-wood, creasote, and certain terebinthinates, in the cure of gonorrhœa? Do not all these drugs exercise their therapeutic virtues by certain of their constituents, for the most part demonstrable, being conveyed by the urine to the site of the disorder? What is this but a cure by injection, or, to be etymologically correct, ejection? It is the urine of the patient that conveys the specific to the disease, just as the rose-water in your injection does the sulphate of zinc or other astringent.* It is the abuse of injecting that is open to animadversion. Injections, in the treatment of gonorrhœa, do harm only when, by reason of their composition, they act as irritants to the mucous membrane and cause pain.

---

* Called by the French, *Goutte militaire;* by the Germans, *Nachtripper.*

In the ordering of urethral injections, there are two rules which should be followed:—1. Do not strain the urethra by the *quantity* of injection used. 2. Do not pain the urethra by the *quality* of the injection. A teaspoonful of fluid *put* into the urethra frequently is better than a tablespoonful *forced* in three times a day. This is a point upon which I have long insisted. In reference to this subject, I thoroughly endorse the following passage:—"I cannot refrain here from making an observation about injections in the urethra. The remark is frequently made that they sometimes produce orchitis. It may be that some injections do so through their caustic and irritating nature, but, in the greatest number of cases, I convinced myself that the injection pushed with great force into the urethra acts quite mechanically, like a large bougie, and this violent mechanical dilatation by the liquid produces orchitis. Since I came to this practical conclusion, I have recommended my patients to use injections very gently, and since then I have not seen any cases of orchitis occur. This observation is applicable to any kind of injection, and I have seen orchitis take place even in cases where only tepid or cold water has been thrown with force into the urethra, and such an occurrence will happen, principally in persons of irritable constitutions."*

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* Somewhat similar results appear to follow inhalation. Taking the idea from Professor Dittel's paper on the benefit obtained in cases of pyelitis and catarrh of the kidney-tubes by inhaling certain essential oils, Zeissl tried it in purulent urethritis. The case selected was a male with a copious discharge, and he was caused to inhale the vapour of rectified oil of turpentine, morning and evening, for a quarter of an hour at a time. On the second day the urine betrayed the odour which is likened to the smell of violets, and is usual in that secreted by patients taking the oleo-resins. The inhalations caused no inconvenience, and were steadily continued for twenty-five days, at the end of which time the pus had entirely disappeared from the urine. The experiment was repeated in a second case, with like results.—*London Medical Record*, vol. i. p. 361.

A curious effect of what I believe to have been due to inhalation was brought before the notice of the Liverpool Medical Institution, in 1866, by the late Mr. T. Shadford Walker. The whole crew of a ship, carrying a cargo of turpentine, had suffered during the voyage from hæmaturia, in one case with a fatal result.

It is always well for the practitioner to see for himself that the patient knows how to inject the urethra properly. In many instances, ignorance of this is the sole cause of a urethritis passing into a chronic gleet. Some merely force the lotion within the prepuce, whilst others are so clumsy in their manipulations that the fluid fails to remain in contact with the interior of the canal.

Plugging the orifice of a long prepuce with cotton wool to absorb the discharge, and thus interfering with the natural process of drainage from the canal which always, though imperceptibly, goes on, is a common cause of a persistent gleet. To avoid soiling the linen by these discharges it is far better for the patient to wear a layer of linen secured by safety-pins to the inner surface of his underclothing. What answers very well for this purpose are the sanitary diapers of antiseptic material which are now made. By attention to details such as these a urethritis is often prevented ending in a stricture. Apart from its relation to stricture, it must be remembered that so long as a urethral discharge, however slight, affords evidence by the microscope of bacterial life, it is capable not only of infecting others in a similar way, but of being reproduced in the individual, by slight causes, with all its original intensity. In this way, a gonorrhœa may be so indefinitely protracted as almost certainly to lead to the formation of a stricture.

In prescribing injections you should feel your way, adding to their strength according to circumstances. Some persons, it is well known, are far more sensitive to the action of remedies than others; and this applies equally to the urethra—" The temper of the urethra varies as much as the temper of the mind."* An injection appropriate in strength for one person is not necessarily applicable to another. I remember ordering a chronic patient an injection, well known as " the four sulphates." It cured him effectually, and without pain. A friend, hearing of the success, borrowed the prescription, and used it. The consequences were, an acute attack of cystitis, and a subsequent stricture. Surely, it is only to the foolhardiness of the sufferer that such a result is to be attributed.

---

* Dick, *On the Pathology of Gleet*, 1858.

As indicating that strictures occur with great frequency in persons who have been treated for gonorrhœa without local application, Sir Everard Home observed:—"Three-fourths of the native East Indians of rank are troubled with stricture, which is entirely attributed to the effect of gonorrhœa, for the cure of which no local applications are in use."† And I would here remark, that I have seen a great deal of damage done, and suffering occasioned, by the use of some of the nostrum injections advertised throughout the country as "infallible cures" and "preventives." Many of them contain the ordinary astringents applicable to the urethra, but in a very potent form. I caution you therefore against sanctioning their use.

These observations have been made with the view of showing that it is only by their improper use that injections are open to the charge of occasioning stricture. If they are prescribed in accordance with the rules I have given, you will never have cause to regret their employment.

The greater proportion of strictures occur at the sub-pubic curvature of the urethra; here for their detection and treatment we are dependent upon various kinds of instruments known as bougies; consequently it is of the first importance that we should accustom ourselves to their use, in order that we may diagnose correctly and treat skilfully. Various explanations have been offered of the frequency of stricture in this position. It is quite obvious why traumatic stricture should most frequently occur here, as the urethra is violently dragged, by the force applied, from where it is fixed by its connection with the triangular ligament. It is at first sight less apparent in reference to stricture resulting from chronic urethritis. I think the explanation offered by Mr. A. P. Gould* is probably the correct one. By reference to the diagram accompanying Mr. Gould's paper (Fig. 1), it will be seen that the portion of the urethra which is more frequently strictured than any other is horizontal, and here

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* Brodie, *On Diseases of the Urinary Organs*, p. 50.

† *Stricture of the Urethra*, 3rd edition p. 34.

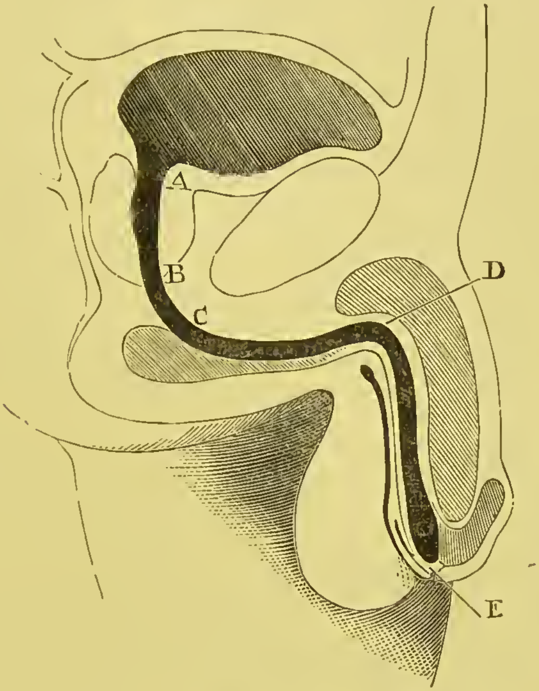

Fig. 1.
A—C. Prostatic and Membranous Urethra.
C—D. Bulbous Urethra.
D—E. Penile Urethra.

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* *The Lancet*, Dec. 8, 1877.

it is that morbid secretions are apt to collect and to cause inflammation.

It will be convenient here to make some observations on the pathology of gleet, more particularly in reference to its association with stricture. Considerable light has been recently thrown by Oberlaender and the late Mr. Berkeley Hill on this subject, and various effects of persistent inflammation within the urethra have been carefully studied by means of the electric endoscope. In the earlier stages of gleet observation shows that the process consists in more or less acute epithelial desquamation at points in the deep urethra, where the disease is more commonly situated. In this way the slight amount of purulent discharge, which may be said to constitute the disease, is supplied. Though there is generally some tumefaction about the affected spots, no stricture can then be said to exist, and treatment is still capable of bringing about a complete restoration of the parts without the subsequent introduction of any contractile tissue. And this brings me to consider the next stage in the process which eventually leads to the formation of an organised stricture. The function exercised by the epithelial coat of the urethra, and the consequences that may ensue when this covering becomes deranged by persistent inflammation, formed the subject for some observations in my Lettsomian Lectures in 1888. The view that I then advocated was, that by chronic inflammation, such as we see in gleet, the epithelial coat becomes so damaged at one or more spots as to lose its power of rendering the urethra urine-tight, and that a slow process of exudation through the mucous coat ensues. As a consequence of this, and to prevent urine sinking further into the tissues, inflammatory lymph-exudation in the sub-mucous area is excited, and barriers of lymph which eventually become organised are thrown out opposite the places where the leakages have taken place. The contraction of these sub-mucous lymph barriers, I urged, completed the process o stricture formation. This view as to the pathology of stricture is supported by the following considerations :—(1) That though the mucous membrane is the tissue chiefly concerned in the primary inflammation, it is as a rule only secondarily implicated in the stricture-forming process. In many instances it will be found after death that the dimensions of the mucous membrane are not permanently altered, and that it is possible to split a stricture without necessarily rupturing the lining membrane of the canal ; and (2) the great variety in form and shape in which stricture tissue is deposited in relation with the urethra. I have known as many as a dozen irregular points of contraction in the urethra of a man, which were believed to have been formed in the way I have described, consequent upon a very chronic gleet.

Though the views I have thus given expression to recognise the existence of varying degrees of tumefaction or swelling within the urethral walls at one or more spots in the initial stage of the stricture-forming process, I cannot admit the propriety of proceeding to the performance of internal urethrotomy for their removal, even though, as I have no doubt, they are capable of being demonstrated as obstacles to micturition by such instruments of precision as Otis's urethrameter. My experience, derived from the observation of cases of this kind which had been submitted by various surgeons to internal section, is certainly not favourable to this method, however well adapted it may be to some advanced forms of cicatricial stricture. Some of the worst cases of stricture in the deep urethra that have come under my notice have been those where an internal urethrotomy had been performed during the early or gleety stage of the affection. In the pendulous urethra such ill effects following the operation have not been so frequently noticed.

In giving expression to these views as to the pathology of gleet and the healing of wounds of the urethra, it is for the purpose of emphasising the importance of thorough irrigation in connection with the prevention and treatment of urethral stricture. I have long felt that the difficulty in this class of affections lies, not in the want of suitable medications, but in our imperfect means of using them. It is astonishing what perfect douching with water or some mild astringent will do in some cases where individuals are driven into the depths of despair by some small amount of urethral discharge, which frequently is no more hurtful than are the slight chronic excretions which proceed from other parts of the body that might be mentioned. The first apparatus I described for this purpose consisted of a Higginson's syringe, fitted with a small rubber catheter, by which a running stream of water could be maintained from any point in the deep urethra, outwards.* More recently I have adopted for the same purpose, as giving a more equable stream, a simple syphon apparatus, which was first made by Mr. Reynolds, of Liverpool, on the principle of Thudichum's nasal douche. It is principally in the treatment of gleet that I have found this instrument of most value. As a rule, the reservoir is filled with about six ounces of a solution of sulpho-carbolate of zinc, two grains to the ounce, with which the patient irrigates his urethra for some minutes once or twice a day. By compressing the meatus around the pipe of the irrigator the outflow is temporarily stopped, and the fluid is forced by hydrostatic pressure into the various lacunæ of the urethra, which, in chronic cases particularly, are more or less centres of infection. It is almost impossible to obtain this thorough mode of irrigation with an ordinary glass syringe, as the latter is often only worked at a great disadvantage, as I have had the means of demonstrating in a very simple manner. Alum, zinc, borax, acetate of lead, or Condy's fluid, may in some instances be substituted for the sulpho-carbolate of zinc, but the latter has proved to be the most reliable. Now this simple, but not I believe sufficiently well-known means of douching the urethra, is capable of extension to other conditions than that mentioned, where it is necessary to bring the canal under direct medication. There are other discharges—prostatic, seminal, and mucous—which are often maintained by an unhealthy state of the urethra ; for such of these as require local treatment, I have found it in the irrigator, rather than in the employment of those powerful and dangerous cauterisations which at one time were advocated by Lallemand and others. In cases of orchitis, where the infection has proceeded from the urethra, as in gonorrhœa, I have found deep urethral irrigation with a solution of perchloride of mercury (1 in 10,000) most effective in shortening and moderating the attack.

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* *On the Prevention of Stricture and Prostatic Obstruction*, Churchill, 1881.

It not unfrequently happens that the urethra is strictured at more than one point. Hunter gives an instance where a urethra contained six strictures, and even more than these have been found by Lallemand and other writers. You will, however, seldom meet with cases where the number of strictures exceeds three; two are not uncommon. Where there are multiple strictures, and the anterior one is tight, the difficulty of passing the distal ones is often much increased by the firmness with which the instrument is grasped by the anterior obstruction. In such instances it is either necessary to deal with the anterior stricture independently by dilatation, or preferably, where feasible, to remove all the contractions at once by internal urethrotomy.

It must be remembered, especially in connection with the introduction of instruments, that the course of the urethra is often deviated by reason of the cicatricial material constituting the stricture being irregularly deposited. Hence we have what are called concentric and excentric strictures. In the former the passage, though contracted, still remains central; whilst in the latter, which includes the large majority of strictures, the canal is pushed to one side, and thus rendered not only more or less impervious, but also tortuous.

I frequently demonstrate this when using the fine whalebone bougies in cases of advanced stricture. In passing one, if any hitch to its progress is found when the stricture is reached, I withdraw it and bend the tip to an angle, as represented in the accompanying sketch :—

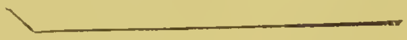

Fig. 2.

On re-introducing it, and giving it a spiral or corkscrew movement on approaching the stricture, I then usually find no difficulty in carrying it on into the bladder, the explanation being, that the axis of the canal is not central. You have, in fact, to seek the opening through the stricture in a corner or angle of the canal, and not, as we generally expect to find it, in the middle. The small gum-elastic filiform bougies adapt themselves to this condition of things, and hence have an advantage over the unyielding metallic instruments. Ignorance of this in using metallic instruments frequently leads to the formation of false passages, force being substituted for the *tactus eruditus* which is alone necessary.

Just as there are varieties in the form and position of strictures, so are there differences in what I may call their temper. One is indolent whilst another is irritable; a third is contractile, and a fourth hæmorrhagic. The irritable stricture, as the name implies, is more or less intolerant of all instrumental interference, such as the passing of bougies or of catheters. It is usually accompanied with muscular spasm, which adds considerably to the distress of the patient. Hence it is not amenable to treatment by gradual dilatation, as each passing of an instrument is commonly attended by some urethral distress, such as retention, the discharge of blood, or a rigor, followed by varying degrees of febrile excitement. The contractile stricture is one that you can dilate, but it does not retain, even for twenty-four hours, any of the additional calibre you may have given it by the gradual introduction of bougies in successive sizes. It simply speedily falls back to its original narrowed dimensions. These are the strictures which are generally benefited by section—that is to say, by external or internal urethrotomy.

Though these and other varieties in the temper of strictures are often due to physical causes in their construction, it must not be forgotten that other agencies may be at work causing spasm. I refer to the various sources of irritation which are provoked by the unrest to which strictures are subjected. By an abnormal condition of the urine, often in itself intensely irritating, by repeated and imperfect acts of micturition, and often by the artificial expedients unsuccessfully employed with the object of affording relief, a stricture may be so worried as to be more sinned against than sinning. Rest in bed, with measures calculated to allay irritation, will sometimes prove that there is a medical as well as a surgical aspect in the treatment of these disorders, and that many strictures are what they are made. There would be fewer cases of impassable stricture if the opportunity could always be taken of eliminating spasm.

SECOND LECTURE.

The Surgical Anatomy of the Urethra — Spasm — The Dimensions of the Urethra — Otis's Views — The Curvature of the Urethra — The Relation of the Urethra to the Rectum—Attachments of Fasciæ—Opening of the Seminal Ducts.

I shall now ask your attention to some points respecting the structure, dimensions, and anatomical relations of the urethra. The canal is made up of various structures, possessing different properties, and arranged in layers—viz., internally mucous membrane, then involuntary muscular fibre, disposed longitudinally and circularly, and lastly, erectile tissue, which everywhere surrounds it. Further than this, it must be remembered that in its deeper portion the urethra is embedded in voluntary muscular fibres, which are capable of exercising a compressing force upon its walls, sufficient under the excitement of various stimuli to prevent the expulsion of urine from the bladder. This is known as spasmodic stricture. Uncomplicated with organic stricture, it is exceedingly rare. It is usually provoked by some active inflammation of the urethra, such as a gonorrhœa, or by the irritating influence of disordered urine; but when uncomplicated with organic stricture, it can never be regarded as affording a serious obstacle to the passage of an instrument into the bladder. Though this condition, when circumstances permit of it, may be successfully combated by rest, warmth, and opiates, and such other measures as are calculated to remove muscular rigidity, where urgent retention of urine exists, catheterism should be at once practised.

In an instance that came under my notice, the rigidity of the muscles of the perinæum was so unusually great, and the distress on proceeding to pass a catheter so extreme, that I deemed it desirable to place the patient under chloroform. When this was done, a full-sized catheter passed readily into the bladder. In cases of acute spasmodic asthma it is not unusual to find difficulty and spasm in micturating, though there may be no stricture.

In reference to the muscular surroundings of the urethra, it should be remembered that it is the occurrence of spasm which determines retention. There can be no such thing as an impermeable urethra, except in connection with a urinary fistula. So long as the kidneys go on excreting urine, so long, unless a disturbance of muscular action takes place, will urine continue to find its way through the most contracted urethra. Every person who suffers from stricture finds out from experience the maximum quantity of urine over which he can successfully exercise propulsive power; and so long as this quantity is not exceeded, the ability to expel urine remains, although the stream may be exceedingly small, or even issue in drops. Should, however, from any cause, urine be allowed to collect in the bladder beyond the accustomed limit, the propulsive apparatus becomes disarranged by being called upon to do unaccustomed work, and irregular spasmodic efforts take the place of that combined muscular action necessary in the case of a person who at the best of times voids his urine under difficulties. This consideration is offered as explaining how retention may be regarded as an accident occurring in the course of a stricture case, and how it is that spasm becomes superadded to a permanent urethral obstruction. That a plug of mucus within a stricture is often the determining cause of retention there can be no doubt. Proof of this may be found in the fact that the passing of a fine filiform or whip bougie, and its immediate withdrawal, will frequently enable the patient to pass water.

The view that organic stricture within the penile portion of the urethra is occasionally the excitant of spasm in the deeper portion, and that the latter is curable by removing the former by urethrotomy, had some prominence given to it in a discussion between Dr. Otis and the late Dr. Sands, of New York.* That a permanent obstruction in one part may disturb the muscular action of another is what might be expected in a system where the proper performance of function is dependent upon a normal condition and mutual relationship of the whole. I cannot, however, say that I ever met with a case where the spasm so produced was sufficient seriously to oppose the introduction of an instrument along the urethra after the organic penile stricture had been passed. Mr. Annandale † has pointed out the frequent occurrence of spasm of the œsophagus at one point when the seat of real stricture is at another.

The mucous lining of the urethra has depressions in it which in the natural state cannot be regarded as affording any serious obstacle to the passage of one of the larger sized catheters. In cases of stricture, these lacunæ, behind the obstruction, become largely dilated, and are apt then to catch the end of the instrument after it has been passed through the stricture. Again, these dilated lacunæ may afford receptacles for urine, which, becoming decomposed, sets up inflammation within and around the urethra.

The respective dimensions of the urethra are best understood by reference to casts, such as are pictured in Sir Everard Home's work on stricture (Fig. 3).

The erectile tissue, which everywhere surrounds the urethra, is not unfrequently the source of the hæmorrhage which follows where false passages have been made. The hæmorrhage under these circumstances rarely proves very considerable or persistent.

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* *Hospital Gazette*, U.S.A., April, 1879.

† *Liverpool Med.-Chir. Journal*, vol. i. p. 10.

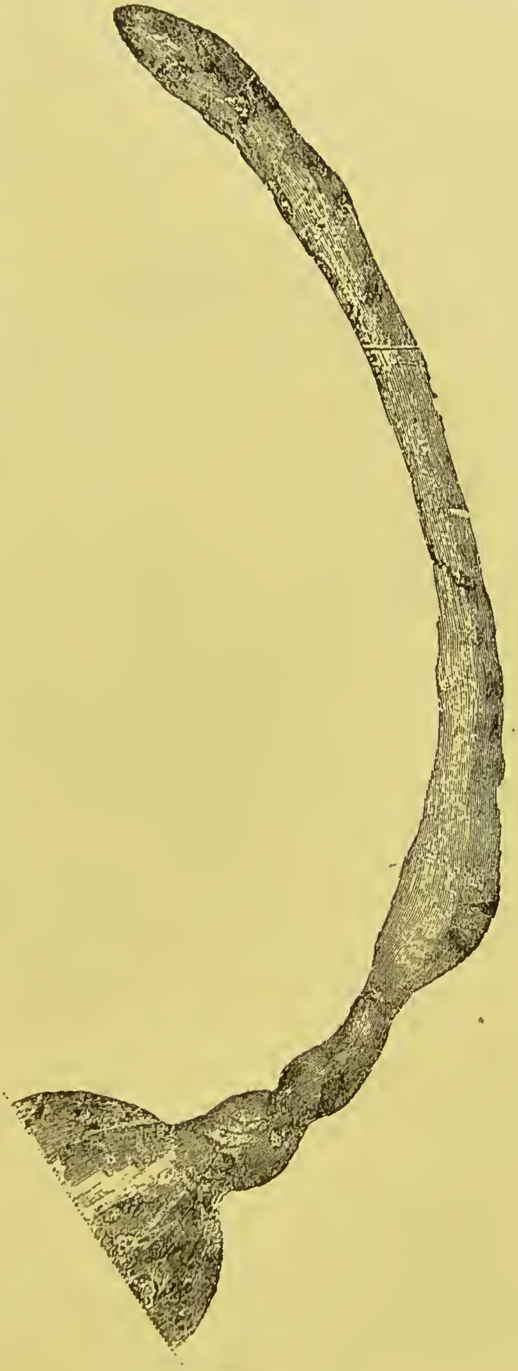

Fig 3.

Dr. F. N. Otis, of New York, in a recent work on the treatment of stricture, advances the proposition that every urethra has an *individuality*, and that no *average standard* is of use in examining a given urethra. This he demonstrates by the use of a very ingenious instrument, called a urethrameter, consisting of a straight tube, the end of which can be made into a kind of fenestrated sphere, the latter corresponding to a dial-plate at the handle, which marks the size of the sphere. By this means, the normal calibre of the urethra can be accurately measured, as also the circumference of the stricture.* To give an example: when the circumference of the penis was three inches, the calibre of the canal was found to be 30 mm. of the French scale; when it was $3\frac{1}{4}$ inches, it would be 32 mm., and so on in proportion. Upon these views as to the measurement of the urethra, Dr. Otis bases a method of treatment which will be referred to again when I come to treat of the various plans of practising urethrotomy.

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* *British Medical Journal*, Feb. 26, 1876.

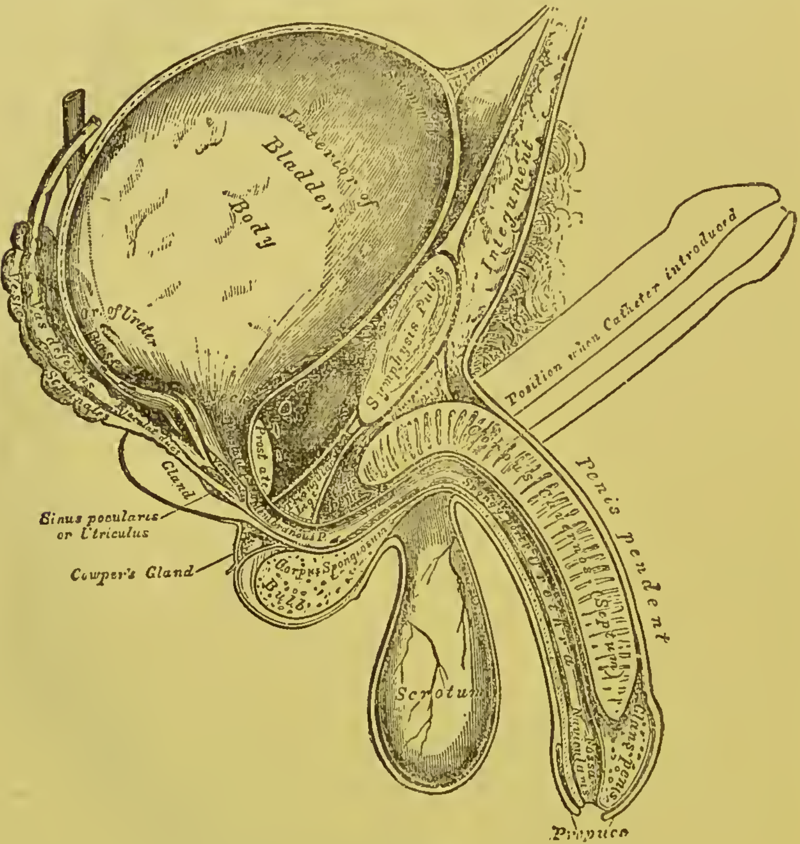

Fig. 4.

If we refer to a side view of the pelvic organs, we can advantageously study the relations of the urethra to the surrounding parts (Fig. 4, from Gray's *Anatomy*). The curves of the urethra should here be noticed, with the view of determining the best position of the parts for the introduction of instruments along the canal. If the operator were to attempt to pass a catheter with the penis in a pendent position, it is evident that he would have to encounter two curves, a difficulty which in the case of a rigid instrument would be found insurmountable; whilst, on the other hand, the position of the penis may be so varied during the operation as entirely to do away with one curve, and materially diminish the resistance of the other.

It may be here observed that the urethra is only rigidly fixed at one part of its course—viz., as it passes through the triangular ligament. In front of this it is sufficiently movable to permit of the whole of the canal being brought upon the same plane as the membranous portion which is contained between the two layers of the triangular ligament. Hence a straight instrument, such as the staff used by Key for lithotomy, may be introduced into the bladder almost as readily as an ordinary catheter. It should be remembered that it is at the point where the urethra goes through the triangular ligament the inexperienced operator meets with his greatest difficulty in passing a catheter, the point of the instrument being usually allowed to drop so as to press against the ligament *below* the urethral aperture.

After noticing its curvatures, we should next trace the urethra in its course to the bladder. The first portion of the passage is subcutaneous, being situated along the under surface of the penis. Here it can be manipulated externally by the fingers, and direct assistance rendered in the piloting of bougies through tight or tortuous strictures. In the case of strictures in this portion, their division by external or internal urethrotomy is accomplished without difficulty, by reason of the facility with which the urethra can here be handled. As the urethra passes behind the scrotum, it becomes more deeply situated, and less accessible to external manipulation; whilst further again, in the perinæum, and behind the triangular ligament, little impression can be made upon it from without. If, however, you will refer to the side view of the urethra, it will be seen that even here it is not beyond the reach and control of the finger. On introducing a bougie into the bladder, and the index finger into the rectum, the line of the deep urethra for an inch and a half of its course can be distinctly made out, and the position of the instrument determined. Now, when we consider that the great majority of strictures are situated in this portion of the canal, this is a piece of anatomical knowledge worth remembering. Fewer false passages would be made in difficult cases of catheterism if we bore in mind that we thus had the means of testing in the deep portion of the urethra the course the instrument was taking, and of assisting its progress through the stricture.

To proceed. If the finger is carried still further, the line of the prostate can be distinctly made out, and any alteration in its size or consistence noted. In difficult catheterism, arising from prostatic enlargement, assistance may often be rendered in "tilting" the instrument into the bladder by the finger in the rectum. Further than this, where, by reason of the enlargement of the middle lobe, there is much resistance to the entrance of the catheter into the bladder, by placing the finger as a support to the prostate, that concussion or shaking of the part is prevented which has sometimes led to the occurrence of pelvic cellulitis. A reference to Figure 4 also shows that in retention of urine the posterior wall of the bladder can be explored and commanded sufficiently to admit of its being punctured without injury to the surrounding parts. In children, not only can a stone in the bladder be felt by the finger in the rectum, but, as Mr. Thomas Smith has pointed out, its removal may be facilitated.

Turning to the anterior aspect of the bladder, we should observe that the peritonæum, in its reflection from the back of the abdominal muscles on to the bladder, leaves a space just above the symphysis pubis, where the bladder, when it is distended, may be punctured without injury to the peritonæum.

It is in this position that supra-pubic lithotomy is performed, advantage being taken of the fact that here the bladder may be reached without wounding the peritonæum. Dr. J. G. Garson* has shown that it is possible by distending the rectum to increase this interval considerably, and thus under certain circumstances, as will presently be mentioned, to facilitate the performance of supra-pubic cystotomy.

Dr. A. Barron has called attention to an arrangement of the fascia immediately in front of the bladder, which surgically is important.† I will quote his own words:—"Returning now to the transversalis fascia on the anterior abdominal wall, and tracing it downwards from the neighbourhood of the umbilicus, we find that it here splits into two laminæ, the anterior of which passes down behind the rectus muscle, and is attached to the upper border of the pubis; the posterior layer being carried by the urachus to the posterior aspect of the bladder, is there continuous with the recto-vesical, or middle lamella of the visceral fascia, and finally along the base of the bladder with the posterior part of the capsule of the prostate. It will now be seen that a space exists between these two laminæ of the transversalis fascia which is termed the porta vesicæ of Retzius, or the pre-vesical space, into which, and not into the sub-peritonæal space, the bladder rises when distended. This pre-vesical space is of the greatest importance in surgery. In opening the bladder above the pubis it is entered, and the viscus can be opened to a considerable extent in the middle line without the operator running any risk of injuring the peritonæum, or entering the extra-peritonæal fatty tissue, the operation being entirely confined to the space in question, so long as the incision is confined to the anterior aspect of the bladder, and does not extend backwards beyond the urachus. Again, when, as frequently happens, there is fracture of the pelvis with extra-peritonæal rupture of the bladder by a fractured pubic ramus, it is evident that the urine will be discharged into the pre-vesical space, and supposing the bladder to be drained by a perinæal incision, this incision will be very unlikely to drain the space of its contained urine, which will remain mixed with blood, and in contact with the fractured bone." Of course, it will be understood that this disposition of the fascia can only be regarded as a space when either the bladder as it distends, or fluid when extravasated, make their way into it. I shall again refer to it and its surgical importance when I come to speak in detail of supra-pubic cystotomy and rupture of the bladder.

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* *Edinburgh Med. Journal*, October, 1878.

† *Liverpool Med.-Chir. Journal*, January, 1885.

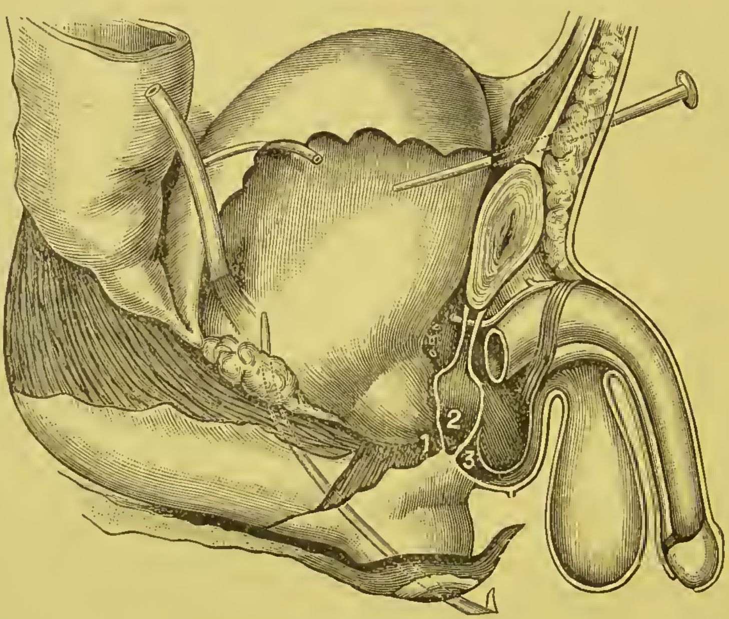

Fig. 5.

We should now proceed to notice the attachments and connections of the various fasciæ having relation with the urethra; for we shall find that when matter forms around the urethra, or extravasation of urine occurs, the direction taken by these fluids is entirely influenced by the attachments of the fasciæ. If you refer to a side view of the pelvic fasciæ (Fig. 5), you will see that there are three distinct compartments where, about the perinæum, fluid may collect. When matter forms around the prostate in the compartment marked 1, it cannot come forwards, in consequence of the triangular ligament; it therefore goes backwards into the cellular tissue of the pelvis, where it will spread with great rapidity and fatality, under the name of pelvic cellulitis. The formation of matter in this position may be occasioned by injuries to the prostatic portion of the urethra. Not unfrequently it is the cause of death in lithotomy, where the incision into the prostate has been so free as to include its fibrous investment. When matter forms in compartment No. 2, between the layers of the triangular ligament, it either bursts into the urethra or makes its way towards the anus. Suppuration in this position not unfrequently takes place as a consequence of a very acute urethritis, and gives rise to the belief that inflammation of the prostate has occurred. Abscess here often simulates suppuration in the prostate, and is mistaken for it. Retention of urine, from pressure on the urethra, may in this way be caused, and relief is not obtained until either the abscess bursts into the urethra or is opened by incision.

When matter forms in compartment No. 3—that is to say, between the superficial perinæal fascia and the superficial layer of the triangular ligament—fluid is conducted towards the scrotum, and thence it may pass to the anterior surface of the abdominal parietes, over a very considerable area. If unrelieved, the damage that is done to the tissues in contact with extravasated urine is immense; large portions of skin and cellular tissue slough and are discharged, and high constitutional symptoms, which tend rapidly to assume a typhoid character, not unfrequently are consequent upon the presence of urine in this position. Unless relief is speedily afforded by the knife, urine may travel as far as the umbilicus, or even above it, as we often see.

Passing to the interior of the urethra, I would remind you that within it are the openings of the canals conveying the semen, and other fluids which it is supposed are engaged in its elaboration. Hence we may infer that that which is an obstacle to the natural escape of urine, is, *pro tanto*, an obstacle to the efficient discharge of the other secretion; and this undoubtedly we find to be the case, for sterility on the part of the male is frequently met with as one of the consequences of stricture.

There is one very important landmark which must not be passed by unnoticed. If you expose the perinæum, you will see that it is marked along the median line by a prominent ridge or elevation, called the raphe = Greek, a seam. This is a guide to us in many operations on this part. Along it the perinæum can be incised for stricture, abscess, or extravasation, to any necessary depth, with no risk of serious hæmorrhage occurring, whilst in the operation of lateral and median lithotomy it indicates the position of our first incision. When the perinæum is tumid from extravasation of urine or suppuration, it not unfrequently happens that the raphe is more or less pushed over to one side or the other, or even slightly curved. The incision to open the perinæum must correspond with such a deflection, otherwise troublesome hæmorrhage is likely to follow.

Where incisions into the scrotum are required for giving vent to urine which has become extravasated, these are best made on either side of the raphe, where the fluid sometimes collects in considerable quantity. The incisions should be sufficiently long, and extend well into the œdematous cellular tissue, so as to permit the escaped fluid and purulent matter to be squeezed out with the hand. In this way large quantities of intensely irritating fluid may be removed, and gangrene of the tissues prevented. No fear of hæmorrhage need here be entertained. Under these circumstances it is also generally necessary to incise the body of the penis on either side, otherwise sloughing is sure to follow if the urine has reached the subcutaneous tissue of this organ. In some forms of urinary extravasation, where the stricture is in the penile portion of the urethra, the penis is the first part to become œdematous. When the extravasation is from the deeper portion of the canal, this is generally noticed after the scrotum has become distended. It is important to prevent the skin of the penis sloughing indiscriminately, otherwise large cicatrices may be left, which seriously interfere with the subsequent erection of the organ. I have met with several instances of this, and most troublesome distortions they prove to treat. Timely incisions in proper directions would have prevented this.

THIRD LECTURE.

Symptoms of Stricture — Granular Urethritis — Consequences of Stricture on the Genito-Urinary Organs—Nervous and Spasmodic Affections simulating Stricture.

The patient's suspicions that he is suffering from stricture are usually first aroused by his noticing some alteration in the force, direction, or size of the stream of urine in the act of micturition. Unfortunately, however, for him, these indications do not generally become apparent until the disorder has made some considerable progress. It is of the first importance, then, that we should consider what may be regarded as the premonitory stage.

If we analyse the symptoms of stricture, excluding, for obvious reasons, cases of traumatic stricture and such-like causes of obstruction, we shall be able to refer them to one of two classes—viz., (*a*) symptoms indicating inflammation, and (*b*) symptoms of obstruction.

The symptoms of the first class—namely, those of inflammation—not only precede those of obstruction, but usually extend over a considerable period of time. Most frequently they are consequent on an acute gonorrhœa, and their extreme slightness, and the little inconvenience they occasion, are apt to render the patient almost unmindful of their presence. The only outward sign may be a continuous, though slight, muco-purulent discharge. Such a discharge is usually most obvious in the morning, and is often only sufficient to glue together the lips of the urethral orifice.

Further examination proves the existence, in varying degrees, of what are regarded as the cardinal symptoms of inflammation. Should we proceed to examine the urethra of such a patient with a bougie, there is *pain*, and an unpleasant sensation of *heat* as the instrument passes over the seat of the disorder; and that some inflammatory exudation—*swelling*—has taken place is evident by the resistance to the instrument that the operator is conscious of. That there is *redness*, or congestion of the part affected, is proved by endoscopic examination, should this be considered necessary for completing the diagnosis. These signs of inflammation—pain, heat, swelling, and redness—are usually accompanied by some obvious perversion of function. Not rarely there is frequency in micturition, as well as painful nocturnal emissions. These symptoms indicate the premonitory stage of stricture. The urethra presents a granular appearance, a condition which has its counterpart in the unhealthy eyelids of scrofulous children, with which we are so familiar.

The inflammatory or premonitory symptoms, if unchecked, sooner or later give place to those indicating that obstruction has taken place; the stream of urine as it issues is wanting in force, or it is twisted or diminished in size, and as the contraction goes on these inconveniences increase. A very common symptom of stricture is the involuntary discharge of a small quantity of urine after the person has supposed he has finished, thus annoying him by wetting his linen.

In some cases the symptoms are of an anomalous character, and have no obvious correspondence with the description I have given. The formation of a hernia, or an enlargement of the testicle, may be the only indication of an urethral obstruction. It is also not uncommon to meet with cases where a sudden retention of urine is the first intimation to the patient that he is suffering from stricture. Incontinence of urine, especially at night, is sometimes caused by stricture. I was recently consulted by a medical man in reference to this symptom, which I was able to explain and remove by the detection and treatment of a tight stricture he was not previously aware of. Blood and albumen in the urine may also be caused by a stricture. I have known both disappear in many instances where the obstruction has been treated. It seems strange that progressive changes in the urethra, such as stricture involves, should go on without the patient being aware of them, until, as it were, a crisis is reached. But so it is. A certain proportion of cases fails in affording a satisfactory explanation, further than to suggest that the patient has been wanting in the commonest observation.

That stricture may render a man sexually unproductive, I think there is sufficient evidence of. I have known the successful treatment of a stricture immediately followed by conception on the part of the wife after years of supposed sterility. A medical man, whom I treated for stricture, used to complain to me that after lascivious dreams, from which he occasionally had the misfortune to suffer after an exposure to the sun on the West Coast of Africa, he was conscious of severe nervous prostration, though there was no external evidence that a seminal emission had taken place during sleep. On each occasion, however, when this complaint was made, abundant spermatozoa were found in the urine. Both Dr. Barron and myself were able to satisfy ourselves upon this point. It seemed obvious that the stricture prevented the emission taking place in the usual way, and that consequently the seminal fluid made its way backwards into the bladder when the orgasm took place.

The obstructive material, whilst these symptoms are continuing, gradually alters in its character. At first, it is merely an inflammatory exudation, soft and readily compressible; later on, as it becomes organised, it tends to resemble, not only in appearance, but also in its disposition to contract, the tissue of which scars are made up. The degree of resistance that this adventitious tissue is capable of offering is often remarkable, whilst in extent it is in some instances sufficient to convert the whole perinæum and scrotum into an indurated mass. The worst feature connected with this deposit is its indisposition to become to any extent absorbed. You may exercise pressure upon it, you may divide it with the knife, or act upon it with caustics, but you cannot entirely remove it or deprive it of its inherent quality of contraction. Hence the importance of endeavouring to prevent this kind of tissue formation.

The treatment of advanced stricture will, therefore, be seen to resolve itself to a great extent into palliating and adapting, and this has been brought to such perfection that it is remarkable how little distress the patient may be conscious of, provided he exercise a moderate amount of care and precaution in the management of his own case. And, in speaking of treatment, it is well that we should understand our position in reference to the disorder we undertake to treat. Fortunately for mankind, there are many of its ailments which have a natural tendency towards what I may call a spontaneous cure, and even some of the most malignant diseases occasionally undergo changes of a benign character, remain quiescent, and cease to trouble. It is not so, as a rule, with stricture, unless it is kept in check by appropriate means; it is progressive, and the longer it remains untreated, the more hurtful it becomes.

It will be desirable here to note the remoter changes that take place. As the contraction increases, the urethra behind the stricture becomes dilated, so much so that in some cases pouches are formed in which urine is apt to collect. In long-standing strictures these dilatations are so well marked as not to disappear after the stricture has been remedied. A gentleman, who some time previously had a tight stricture divided at the orifice of his urethra, consulted me in consequence of the very disagreeable odour of his urine when first passed in the morning. On examining him with a catheter, I found that urine collected in two very considerable pouches in his urethra. I advised him to drain his urethra every night, just before going to bed, by means of a catheter, slowly introduced and withdrawn. This had the desired effect, and speedily removed the inconvenience he complained of. These pouch-like dilatations behind the stricture, which not unfrequently extend to the small ducts and lacunæ opening into the canal, are often the cause of peri-urethral, or, as it is otherwise called, urinary abscess. After an instrument has passed the stricture, its point is apt to catch in these dilated lacunæ, and its further progress is arrested.

The constant presence of urine in the urethra behind the stricture sets up inflammation, not only within the canal, but also around it. Should suppuration occur, unless relief is given externally, the matter will find its way, by ulceration, into the urethra, and extravasation of urine follows. In the great majority of cases it is in this way, I believe, that extravasation happens, and not, as we are generally led to suppose, by rupture of the urethra behind the stricture.

It has been proposed to take advantage of the distended condition of the urethra behind the stricture to effect dilatation from behind forwards. Mr. Furneaux Jordan describes, in an interesting paper,* this method of treatment, which he has practised with success.

In addition to these changes in and around the urethra, the bladder becomes structurally altered, in consequence of its action and function being disturbed by the obstacle to micturition. In one case you will find its walls thickened and its cavity contracted, whilst in another it is expanded, with walls thinner than natural. In the former it is hypertrophied, for the purpose of overcoming the resistance offered by the stricture to the natural discharge of the urine; just as the heart, by an increase in its bulk, compensates for the resistance that is offered to it by an impeded circulation. Where the bladder is dilated and thinned, it seems to have gradually yielded to an obstacle which it has been beyond its power to overcome. What determines the one or other condition is not always obvious.* Probably the degree of irritability the stricture occasions, or the disposition of the patient, has something to do with it.

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* *British Medical Journal*, Nov. 9, 1872.

It occasionally happens, though rarely, that rupture of the bladder takes place during the effort of a patient to overcome an obstacle. An instance of this came under my notice some time ago. Here the patient had been suffering from retention for some days. When admitted into the Infirmary he was in a state of collapse, from which he never rallied, dying eighteen hours afterwards. A catheter was introduced into the bladder without difficulty immediately after his admission, but only a few drops of blood-stained fluid escaped. At the *post-mortem* examination, in the posterior wall of the bladder was found a rupture communicating with the cavity of the peritonæum. The edge of the opening was covered with lymph, and the rent measured, when not stretched, an inch and a half in length. There were also signs of peritonitis. Though there could be no doubt of the patient having suffered from retention, no sensible diminution of the calibre of the urethra could be discovered; so that, in the absence of any history of an injury, we must conclude that the obstacle was occasioned by spasm, and that the rupture was caused by natural efforts.

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* Mr. Cadge's explanation is a probable one:—"Muscular hypertrophy of the bladder, as of the heart, may exist under two conditions, simple hypertrophy or hypertrophy with dilatation. The former is seen most frequently in cases where the obstruction is due to stricture, where the patients are of middle age, and in the possession of fair vital power; the latter in the aged, whose enlarged prostate is the impediment, whose vital power is on the wane, and in whom the bladder is apt to exhibit atony or even paralysis."—*British Medical Journal*, October 2, 1875.

The history of the case would admit of no other conclusion than this, which, I believe, is the correct one. The specimen is preserved in the Museum of the Liverpool School.

Going still further back, we find the ureters and kidneys yielding to the pressure of the *vis a fronte;* these may, in the course of time, become mere tortuous tubes, and little else than subsidiary bladders, as you may gather from numerous specimens. Kidney disease, varying from slight congestion to almost complete disorganisation, is a frequent concomitant of stricture: this is a fact which should never be lost sight of, and brings me to notice the importance of examining the urine.[*]

No operation, however slight, can be regarded as absolutely free from danger, and even the passing of a catheter, simple as it seems, forms no exception to this rule. In an interesting article on urethral fever,[†] Mr. Mitchell Banks narrates a case I well remember, where death occurred six and a half hours subsequently to the passage of a bougie. Allusion is also made in the same paper to a case of Dr. Padley's, where something similar happened. To such exceptional cases I shall again refer.

As no subjects are less suited for operative treatment than those who are suffering from structural kidney disorder, every means should be taken for determining the precise condition of these organs before deciding, in a case of stricture, the line of treatment that is to be pursued, and hence a thorough examination of the urine is of the first importance. The existence of advanced kidney disease will limit us to such proceedings as have for their object the preservation of life, independently of other considerations, and under such circumstances the range of treatment becomes restricted.

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[*] "Among the cases of stricture, one hundred deaths occurred [in Guy's Hospital] in nineteen years, giving a yearly average of about 5·26. Of the whole number of cases, the kidneys were suppurating in forty-one of the hundred; they were wasted away or inflamed in eighteen; in seven they showed evidence of the changes included under the term Bright's disease, or were cystic; while in the remaining thirty-four they were healthy. Thus fifty-nine, or nearly three-fifths of all the cases, had advanced disease of the kidneys."—J. F. Goodhart, *Guy's Hospital Reports*, Series iii., vol. xi .

[†] *Edinburgh Medical Journal*, June, 1871.

Amongst the remoter effects of stricture of the urethra, or any obstruction to the voiding of urine, I cannot refrain from noticing those which may be traceable to more or less muscular straining for the purpose of overcoming the obstacle to micturition. The formation of a hernia, or the production of a prolapse of the bowel, are the better known illustrations of this kind. Two cases have come under my notice where, in persons suffering from great difficulty in urinating, the bursting of an internal aneurism was the immediate cause of death. Whether the chronic straining had anything to do with the production of the aneurisms, or favoured their rupture, is a matter for speculation. I merely record the observation, as well as my belief that these two conditions were in these instances related.

Before concluding my remarks on the symptoms of organic stricture, I must refer to certain nervous and spasmodic affections of the urethra which simulate it. Of this class of cases, which are sometimes misleading, you see comparatively few in hospital practice, and it is from other sources that I must chiefly draw the illustrations which will be necessary for my purpose. Because these cases are wanting in certain physical signs, do not for a moment suppose that those who complain of them do so for the purpose alone of exciting sympathy or commiseration; on the contrary, I can assure you the distress that is thus occasioned often renders very miserable the lives of those who suffer from such symptoms, and consequently they are deserving of most careful consideration. I do not know how it is, but when one comes to speak of disorders which are described as of "nervous" origin, we almost unconsciously add the caution that I have given, as if under the generic term of "nervous affection" the most horrible and distressing sensations are not included. Who has not seen patients annoyed beyond measure by that condition which has been so graphically described by Sir James Paget as "stammering with the urinary organs"?* One such stammerer, an elderly gentleman, with a large prostate, I attended for a long time. He used to spend his days in selecting words, the repetition of which, he thought, during micturition, favoured the act. He kept a list of these words by his side, crossing one off when it appeared to him to have lost its effect, or was supplanted by one more potent. Many words were coined for this purpose. It was impossible to refrain from a smile on seeing, as I had often to do, micturition being performed whilst a word was rapidly repeated as if invoking the assistance of some ancient Deity who was specially interested in such matters. And yet to the end of his life my old and valued friend believed in the efficacy of this proceeding. Another gentleman I attended was in the habit of provoking micturition by the sound of water falling into a basin; whilst a lady, after an operation where catheterism was necessary, first spontaneously passed urine after the nurse had given her a mouthful of cold water; for many days afterwards she could never repeat the act until she had previously taken a drink. I could multiply such examples, but it would be at the expense of your time, if not, you might think, of your credulity; but I have said sufficient to show the importance of recognising the morbid effect of nervous influence on micturition. You will not cure your patients by asserting your belief in the non-reality of their ailments; but having carefully established the absence of any organic disease, you may, by your counsel and advice, as well as by your medicine, often do much in restoring the nerve-tone which is deficient, and so prevent the patient drifting into a hopelessly depressed mental condition.

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* *Clinical Lectures*, by Sir James Paget, Bart.

Again, there are a variety of morbid influences, chiefly constitutional, which undoubtedly interfere with micturition by inducing spasm, more or less persistent, in the muscles connected with the deeper portion of the urethra and the neck of the bladder. Under the title of *Contracture du Col Vésical*, various morbid conditions have been described, chiefly by French authorities, as to the existence of which no possible doubt can be entertained, however you may choose to explain them. Of the more recent treatises on the subject, that by Dr. Delafosse may be advantageously studied by those requiring further information.* Examine these cases as you will, with all the light the literature of the subject can throw upon them, you can come to no other conclusion than that the word "spasm," with which we are so well acquainted, as accurately as anything else describes the nature of the impediment to micturition which is their prominent feature. The exciting causes of such spasm are local and constitutional, the former including irritations proceeding from the rectum, such as piles or fissures, whilst amongst constitutional excitants the taints of gout and of rheumatism are the most frequent. The French authorities to whom I have referred lay great stress on rheumatism as an exciting cause of this affection.

In addition to those general principles of treatment which rheumatism and gout require, very great advantage will be found in these cases from a course of treatment at certain watering-places. Of these I may mention as being best adapted to this purpose, Vichy, Contrexéville,† Vittel, and Evian.

As to local treatment, I have little to say. When the exciting cause of the spasm has been removed, I have found benefit from the application of a ten per cent. solution of cocaine to the deep portion of the urethra, for the purpose of removing the extreme sensitiveness which sometimes remains. One or two applications of this sometimes acts like a charm. In a case of this kind much benefit was found from a hypodermic injection of half a grain of cocaine over the pubes at bed-time. Though the dose given in this way may be increased with advantage, it must not be forgotten that larger doses have sometimes been followed by symptoms of faintness.

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* *Sur la Contracture du Col Vésical*, par le Dr. Delafosse. Paris, 1879.

† "Notes of a Visit to Contrexéville," by Dr. F. R. Cruise, M.D., Dublin. Reprinted as a pamphlet from the *Lancet* of June 20, 1885.

In arriving at the conclusion that a case of impeded or hesitating micturition is functional and independent of structural alteration, you must remove all source of error by a careful physical examination of the urethra. If you learn to acquire delicacy and tact in the use of urethral instruments necessary for the purpose, you will never give your patient cause to regret that he has submitted to such an exploration; on the contrary, in the absence of true stricture, he will be comforted by the assurance that he can be completely and permanently relieved.

In connection with nervous disorders of the genito-urinary organs, instances where a variety of neurotic disturbances, for the most part referable either to the urethra or to the prostate, often simulating disorders of a grave character, will not unfrequently be met with. Not a few of these are directly traceable to improper usages of the sexual act, more particularly in reference to the limitation of the species. It is well to learn to recognise these, both in the male and the female, otherwise those suffering in this way—and they do suffer in sensation if not in structure—are pretty sure to fall into the hands of those whose business it is to misguide. A few words of explanation or assurance often save such persons much misery in mind, as well as loss in kind. Urethral neurosis sometimes shows itself by acute pain in one or both testes, of a neuralgic character, without sign of deterioration in the structure of these glands. This is a form of the affection, occasionally a reflex of some other morbid condition which may or may not be removable, that is difficult to cure. A recent author observes: "The use of anodynes is ordinarily reprehensible, as the disease is chronic in character, and a narcotic habit may be readily acquired. If hygiene, the steel sound, the suspensor bandage and marriage do not cure, the case is apt to be hopeless. Galvanism and the application of ice-bags are said to be of service. Castration is not to be thought of, but the idea suggests itself to me that, in an obstinate case, stretching the spermatic cord might be successful in curing the neuralgia."* Two such cases have recently been under treatment, where, other measures failing, I practised a form of neurotomy to which I will refer. In the open operation for certain forms of varicocele, described later on, I have frequently had occasion to observe certain variations in the nerve supply in relation with the spermatic cord. These nerve filaments are chiefly derived from the sympathetic, and may be seen to be more or less developed in different subjects. In the first case I operated upon, three years ago, the patient was almost worn out with the neuralgic pain in both testicles, and was rapidly becoming a victim to morphia. I first exposed, by a linear incision, the right cord just below the external abdominal ring, and having teased out the nerves, or rather the cellular nidus in which they are surrounded, from the other structures of the cord as far as I was able, I removed them with a pair of small curved scissors. The parts being carefully adjusted with catgut sutures, repair took place in the course of a few days. The relief was so great that some months afterwards the patient requested me to do the same for the other testicle. This I did with equally satisfactory results, and he has remained quite free from pain, no textural change being observed in the testicles after several months' interval.

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* *Essays* (*Urethral and Genital Neuroses*), by Dr. G. Frank Lydston. Chicago, 1892.

This operation I have since repeated under similar conditions.*

Stricture of the female urethra is not a common affection. In the few instances that have come under my notice it was referable to injuries in connection with parturition, and chiefly involved the external meatus.

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* *Clinical Journal*, Dec. 7, 1892.

FOURTH LECTURE.

Treatment of Stricture—Gradual Dilatation—Instruments Employed — Filiform Bougies — Continuous Dilatation—Hæmorrhage and False Passages—Excision of Stricture.

I now come to consider the treatment of stricture, and as dilatation by bougies is the most extensively employed means, and as other methods of treatment are more or less subservient to this, it will be proper to give it early consideration.

Before submitting a case for instrumental treatment, the important question should be asked, Is the patient in a suitable condition for its advantageous employment? With few exceptions, persons suffering from stricture seek assistance at times and under circumstances when they are least fitted to undergo the treatment necessary for their cure. The patient who sends for you to relieve his retention has, probably, induced this state by an excess of some sort. The urethra has been rendered irritable by the passage, perhaps, of unhealthy urine, which has provoked sufficient spasm of the urethra to convert impeded micturition into complete retention. I frequently point out the advantage following the employment of rest, and such-like measures, in cases coming for treatment of this kind. A patient was admitted for retention on whom prolonged efforts had previously been made to pass a catheter. I saw from his clothing that he had been bleeding profusely. His bladder could be felt distended above the pubes, though not largely so. Under these circumstances, I ordered him a hot bath and a dose of laudanum, and afterwards to be well covered up with hot blankets. Thus he was enabled gradually to empty his bladder, and on the third day after his admission, at the first trial, I passed a small bougie through a tight stricture without difficulty. Prolonged catheterism is in itself an evil; every deviation the instrument makes from the course of the urethra occasions a rent, and every rent leaves a scar, so that in this way the original stricture may be considerably increased. When circumstances will permit of it, rest and attention to the condition of the urine not only facilitate the passage of instruments, but render their use much more serviceable.

Under ordinary circumstances, I find the recumbent position is the best for the patient to be placed in for catheterism. He is more at his ease, and muscular relaxation is thus obtained. In cases of enlarged prostate the erect position sometimes adds to the difficulty of introducing a catheter by reason of the central portion, when this is involved, pressing forwards over the end of the instrument. On placing the patient in the horizontal position, the growth falls back and permits the catheter to pass with ease. Occasionally it is necessary to put the patient under an anæsthetic. As this cannot conveniently be done in any other than the horizontal posture, it is as well you should accustom yourself to this, otherwise you may expect to find that you are somewhat awkward in your manipulations. If you are only used to catheterise patients standing with their backs against a wall, how can you expect to be dexterous with the lithotrite?

I need not describe how to pass a catheter; observation and a little patience will enable you to overcome those slight obstacles which even the normal urethra presents. John Bell, in his *Principles of Surgery*, aptly remarks, "There is no operation with which I should more earnestly entreat the young surgeon to make himself acquainted than this of introducing the catheter." *Festina lente*—be patient and never resort to force. Endeavour to attain your object without causing pain or hæmorrhage. There is no necessity for either, or rather I would say, the surgeon should know from the first feel with his catheter whether there is likely to be pain, and if so, there is as much need for an anæsthetic as there is in any other operation. A few drops of a ten per cent. solution of cocaine injected into the urethra and retained for a few minutes before an instrument is passed renders the canal practically insensitive. There is nothing which interferes more with the treatment of urethral affections than the apprehension on a patient's part of undergoing a repetition of catheterism where bleeding and pain were formerly the chief features of the proceeding.

The most serious hitch that young operators experience in passing catheters, even along normal urethras, is when the point of the instrument reaches what I have called the fixed portion of the canal. On its way through the canal anterior to the triangular ligament, the catheter is apt, by gravity, to exercise a greater pressure on the floor than on the roof of the urethra; consequently, when it arrives at the fixed point, the instrument is below the level of the aperture in the ligament. This is shown in Figure 6, from Dittel. If you remember that the hitch is best avoided by keeping along the roof of the urethra, and overcome by elevating the point of your instrument, difficulty need not be anticipated. In cases of difficult catheterism, the finger in the rectum is not only often the means of rendering valuable assistance, but it also serves the purpose of verifying the position of the instrument before harm is done. It should not be forgotten that in cases where there may be doubt as to whether the catheter has reached the bladder, we ought to feel the prostate well below the line of the instrument. It is almost impossible to make a false passage into the bladder above or through the prostate, unless it is hypertrophied.

There is much variety in the form and make of urethral bougies and catheters. Some, such as the gum-elastics, you can shape for yourself according to your fancy, or in reference to the particular case; whilst others are made of silver, or some light metal, curved in accordance with the fashion prevalent in their day—fashion appearing, to some extent, to influence surgical matters as well as less important affairs. I prefer the short Edinburgh curves which are associated with the name of the late Professor Syme.

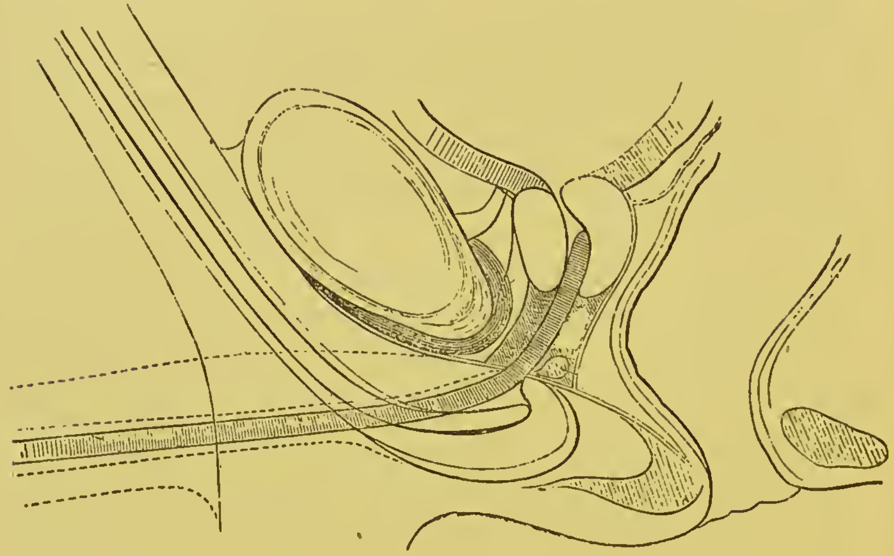

Fig. 6.

In the selection of urethral instruments, whether flexible or metallic, though expressing my own preferences, I would not wish to alter the practice of those who from long experience entertain different views on these points. There can be no doubt that habit in the use of one kind of urethral instrument is an important element of success in conducting these operations. I remember some years ago seeing a sailor in consultation with an excellent Dutch surgeon, and the facile way he passed a metal catheter, which in shape more nearly resembled the long section of a gravy spoon than anything else I could liken it to, fairly astonished me. On the other hand, the look of curiosity with which my friend regarded the long, slender whip bougies I was then introducing into practice showed me that it was possible to attain the same ends but with different instruments. Hence we must not treat too cavalierly the dexterity which has been acquired by practice: it is invaluable, though it may hardly correspond with what we teach.

In referring to these manipulations with the catheter or bougie, it is hardly necessary to remark that all attempts at display must be deprecated as being outside the gravity of a surgical procedure. Simple as it may be, we never know when we may be brought face to face with a case which taxes to the utmost all our resources, and seems to set at naught our boasted dexterity. All such practices, as what used to be called the *tour de maître*, and attempts to acquire them, are to be regarded as more akin to jugglery than to scientific surgery. The surgeon who boasts that he has never failed to pass an instrument into the bladder is to be regarded with some suspicion; he, on the other hand, who quietly and unostentatiously does his best to give his patient the full benefit of his skill, and recognises the moment when the remedy becomes worse than the disease, is to be imitated, whatever his degree of dexterity may be. Not only is it necessary that you should make yourself fully acquainted with all the details of catheterism, and of the various kinds of instruments employed, for your own success as an operator, but also for instructing others in the art. As a certain proportion of males are dependent on the use of the catheter, their comfort is relative to the success with which they can conduct this operation, and any hitch that may occur is apt to be followed by symptoms of a serious nature. Hence no pains must be spared in selecting the instrument appropriate to each case, and in directing as to the manner of using it. To hand this over to the mechanician is a mistake.

When a surgeon undertakes the treatment of a presumed case of stricture, it will be necessary for him to *explore* the urethra, and, in doing this, he should endeavour to obtain the greatest amount of information with the least amount of discomfort to his patient. If there is a stricture, you wish to ascertain its position and the size of the instrument that will fit it. It is my belief that the bougie which best enables us to fulfil these conditions is a flexible one, with the end slightly bulbous and conical, to facilitate its introduction. If a surgeon cannot by this obtain all the information he requires he will not be assisted by the olive-headed instruments which are vaunted for this purpose. It is a matter of touch and of handling. What is wanted is the *tactus eruditus*—the acquisition of which requires as much practice as to detect fluctuation. To the untrained hand, the whole length of the urethra is a stricture, which no form of instrument renders otherwise.

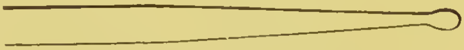

Fig. 7.

For the dilatation of strictures a more conical instrument is better, as it does its work on the principle of the wedge; for this purpose you generally see me employ the whip or bougie-à-boule (Fig. 7). In selection, "preference should be given to such instruments as are rather stiff, but have a long, slender, flexible neck supporting the bulb. When held vertically, bulb uppermost, and touched upon the olivary tip, the neck should yield at once. Such an instrument will guide itself safely, and override obstruction. The olivary points found on the English conical bougie are useless as far as any advantage derived from the bulb is concerned, from a neglect to make the neck of the instrument flexible [Figs. 8, 9]."* You also see me use with advantage, in tight, tortuous strictures, cone-shaped bougies (Fig. 10), without the bulb; these, however, are rather apt to hitch in the lacunæ of the urethra, and, consequently, are not so easily passed as the bulbs.

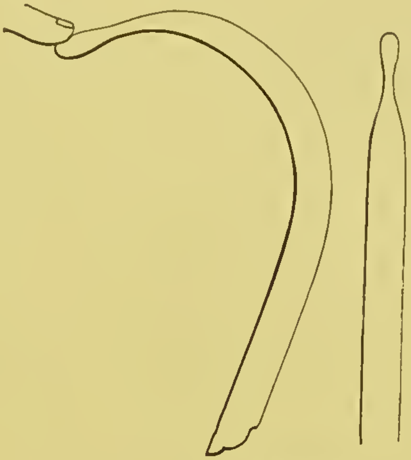

Fig. 8.

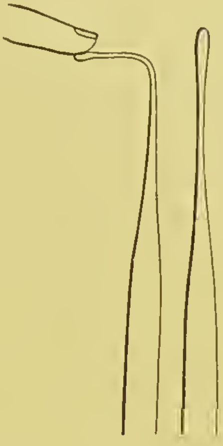

Fig. 9.

The whip bougie is a useful instrument in a variety of urinary disorders. It was first described by me some years ago,† since which time it has been largely used. It consists of a soft tapering gum-elastic, about twenty inches in length, which as it is introduced curls up in the bladder until the necessary dilatation is obtained. Thus the urethra can be enlarged when strictured to three or four sizes with one introduction of an instrument—an important point where the difficulty of the case chiefly lies in entering the obstruction. By slipping a piece of tubing or a silk catheter open at the

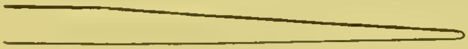

Fig. 10.

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* *Genito-Urinary Diseases*, by Van Buren and Keyes, p. 107.

† *The Lancet*, Feb. 3, 1883.

end over it, it forms a flexible guiding stylet in cases of retention due to prostatic enlargement where the canal is tortuous. For self-catheterism, where there is a hitch at the neck of the bladder from an enlarged prostate, or where catheterism has to be left to a nurse, when the actual calibre of the urethra is not diminished, it will be found useful. Not only are the whip bougies introduced more readily than any other kind of flexible instrument I am acquainted with, but their removal is unattended with distress to the patient. In cases of tight stricture, where bougies of a uniform size throughout are used, it must often have been noticed how the contraction clings to the instrument as it is withdrawn, to the annoyance and detriment of the individual.

More recently I have used these whips for assisting in the demonstration of fistulous communications between the bladder and intestines. In several instances I have been able to afford proof that the instrument had passed from the bladder to the bowel. In some of these comparatively rare and difficult cases an additional means of establishing a diagnosis will in this way be provided.* I must not omit to mention the fine capillary catheters of Dr. Ward Cousins,† which may be insinuated through the most tortuous strictures in the same way as the whip bougies.

The whalebone filiform bougie is another form which you will find useful in the treatment of tight strictures. The dilating power you can exercise with it is not great, but after one or two trials, increased sizes may be made to follow.‡

There is an adaptation of the filiform bougie which is not so well known as it ought to be. I refer to the tunneled bougies and catheters of Dr. Gouley, of New York, which excited interest when I first illustrated their use in cases representing stricture in its worst form, of which the following are abstracts of two :—

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* These instruments were first made for me by Mr. Wood, 81 Church Street, Liverpool, and by Messrs. Tiemann, of New York.

† *Brit. Med. Journ.*, Sept. 17, 1887.

‡ A fuller account of these instruments will be found in a paper by Dr. J. C. O. Will, *Edin. Med. Journ.*, April, 1877.

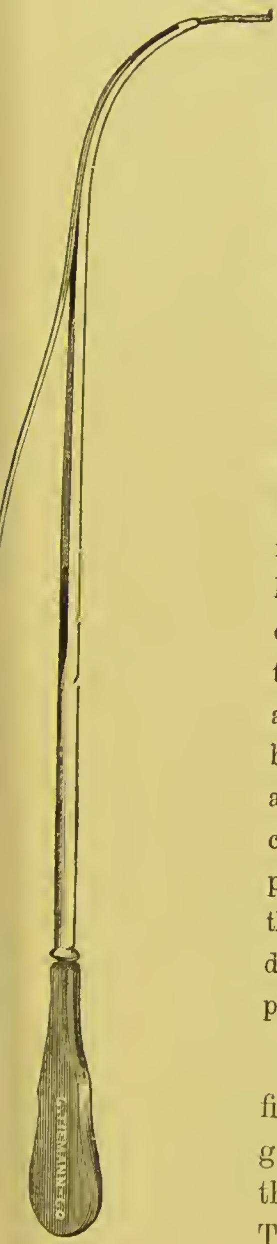

Fig. 11.

Case I.—On June 27th, 1878, J. P., aged 21, was admitted suffering from stricture of several years' duration. On this, as well as on a previous occasion, it was found necessary by my house-surgeon, Dr. G. Hodgson, to tap the bladder above the pubes with the aspirator. This gave immediate relief. Two days afterwards the patient again had retention whilst I happened to be present. I passed one of the filiform bougies, and upon this a tunneled catheter, which was retained for some hours; from this date, dilatation was commenced, the size of the tunneled instrument being gradually increased until a No. 9 ordinary bougie passed easily when the patient left the hospital.

Case II.—J. W., aged 60, was admitted on June 12th, 1878. Thirty years previously he had a fall on his perinæum, rupturing his urethra, for which perinæal section had been successfully performed. The patient does not appear to have followed up his treatment by that regular introduction of bougies which is necessary, and attacks of retention were the consequence. As I expected, I found a tight stricture, which would only admit a filiform bougie. Upon this a tunneled bougie was passed, and dilatation continued until a Holt's instrument could be introduced. On subsequent occasions I passed the latter instrument, using it as a dilator on the principle of a glove-stretcher; by this means the dimensions of the urethra were enlarged, and the patient left passing urine in a good stream.

The tunneled instrument consists of a fine filiform whalebone bougie which acts as a guide, and a catheter or bougie, perforated at the end, so as to run on the former (Fig. 11). To use them the guide is first passed through the stricture into the bladder, some olive oil having been injected into the urethra. In doing so, remember what I said about strictures being eccentric with the opening, not in the axis of the urethra, but, so to speak, in a corner; therefore, when you meet with difficulty in passing these guides, slightly bend their tips and introduce them with a rotary movement, twizzling them, in fact, between the finger and thumb when the stricture is reached. If you feel satisfied from their fixity that they have entered either a false passage or a lacuna, do not withdraw them, but pass another; if you have stopped up one gap, the next is so much the more likely to find its way into and through the stricture. You have seen me with five of these small bougies in the urethra at once, all simply serving to fill up lacunæ and old false routes, and then the sixth, having nowhere else to go, readily passes into the bladder. About the latter result you can have no doubt when it is accomplished, the feel is unlike anything else, and a little practice soon teaches you this. These instruments, though so fine, are very tenacious, and you need have no fear of their giving way. The guide having been passed, then thread the bougie or catheter on to it and run either of the latter slowly along until the stricture is reached. Thus you will be able to exercise more pressure with your instrument to overcome the stricture than you would otherwise like to do. Care must be taken on reaching the stricture that the bougie does not follow under the guide and thus occasion damage.

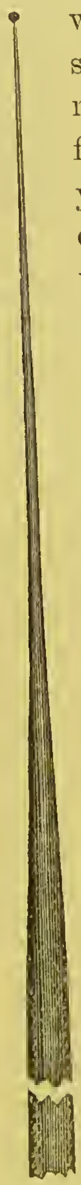
Fig. 12.

Bang's filiform bougies (Fig. 12) are extremely useful where it is necessary to rapidly dilate a tight stricture. They are made of whalebone with a fine taper extremity, terminating in an expanded portion, by means of which the natural dimensions of the canal can be attained. Though you will generally find flexible instruments suitable, you will meet with cases where, with all your patience, either from the hardness of the stricture or the existence of a false passage, a flexible instrument will not pass. Resort will then be made to metal bougies. Let me give you one caution in reference to them. The smaller-sized instruments, unless used with delicacy, may occasion damage, as, by a little pressure, they may be made to work their way out of the urethra. I showed a specimen at the Medical Society, where, in the hands of an experienced operator, a fine metallic bougie had been made to leave the urethra in front of, and to re-enter it behind, a hard stricture.

The metallic instruments generally in use are of a uniform diameter throughout, the end being slightly rounded to facilitate introduction. There is a useful variety, in which the principle of the wedge is introduced, the instruments being made to increase in size from the tip to the curve. The four I have in use are thus arranged: the first represents on the curve, 1 to 3; the second, 4 to 6; the third, 7 to 9; and the fourth, 10 to 12. These four bougies represent a considerable amount of dilating power, and are to be employed with caution. This principle is also carried out in Lister's bulbous bougies, which, in my opinion, are the best metallic instruments for this purpose.

With the instruments I have now brought under notice, provided you will learn how to use them, I do not think you will meet with difficulty, either in detecting strictures or dilating them when necessary. There are one or two points I would remind you of. In the first place, take care that the instrument is smooth, warmed, and well lubricated. For the last purpose I often employ castor oil, as being viscid it is not so easily rubbed off by the first portion of the urethra. Finely carbolized vaseline is an excellent lubricant, and is much used for urethral purposes. Catheters, particularly small ones, are sometimes blocked with old grease

M LIBRARY BATH

or hardened clots. Care should be taken to prevent a difficult case of catheterism being rendered futile from such a cause as this.

Take care that all instruments passed up the urethra are scrupulously clean. You would not like to convey bacteria, or other such-like noxious agents, into the bladder, hence a carbolised oil may be advantageously employed. There is no doubt that cystitis has been provoked by unclean instruments.

In the employment of gradual dilatation, avoid inducing anything like extreme tension. There is nothing so repugnant to the tissues as tension, or which they are more apt to resent. I have seen a case of gradual dilatation delayed for weeks by a neglect of this precaution. The recoil of some strictures immediately after they have been stretched is quite sufficient to occasion retention. In using bougies, then, in increasing sizes, stop short of the one you feel sure may be passed, but will be a tight fit. Proceed cautiously, let a few days elapse, and you will find that on the next occasion the size which would have required some force now passes readily. The frequency with which dilatation is practised depends on the tolerance of the patient. In some it should be done daily, or even twice a day, whilst in others two or three days may elapse between each application. A plan advocated by Mr. Mayo Robson* of dilating some forms of contractile stricture with bougies until a full size (No. 12) or thereabouts is reached at one sitting, has often proved of much value. To leave a man, for instance after an attack of retention, into whose bladder nothing larger than a No. 2 or 3 catheter can be passed at a moment's notice should urgency arise, is not to be commended. This of course requires the use of an anæsthetic.

In the employment of flexible instruments, I advise you to measure them with a gauge, and to work systematically from this, as bougies do not always correspond with the numbers marked upon them. I prefer the French scale, as the increase in size is more gradual than that adopted in England. I make use of a catheter measure (Fig. 13) I first saw employed in New York, as it combines in one instrument the various sizes used for gauging urethral instruments.

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* *Prov. Med. Journal*, No. 7, 1889.

I find the English gauge is too abrupt for many strictures requiring dilatation. Mr. Young, of Edinburgh, has made me a set of Syme's short curved bougies, with an intermediate size introduced between each English numeral. By this plan I have twenty-four bougies to make up my twelve numbers. They are numbered as follows: ½, 1, 1½, 2, and so on, up to 12. It is better to adopt this method of noting the sizes than to propose to alter the numerals. We are all accustomed to the English gauge, and if a bougie is referred to as being, we will say, 8½ English, we know at once the size, and that it is intermediate between an 8 and a 9. No. 15, which is the equivalent to an English 8½, in the French

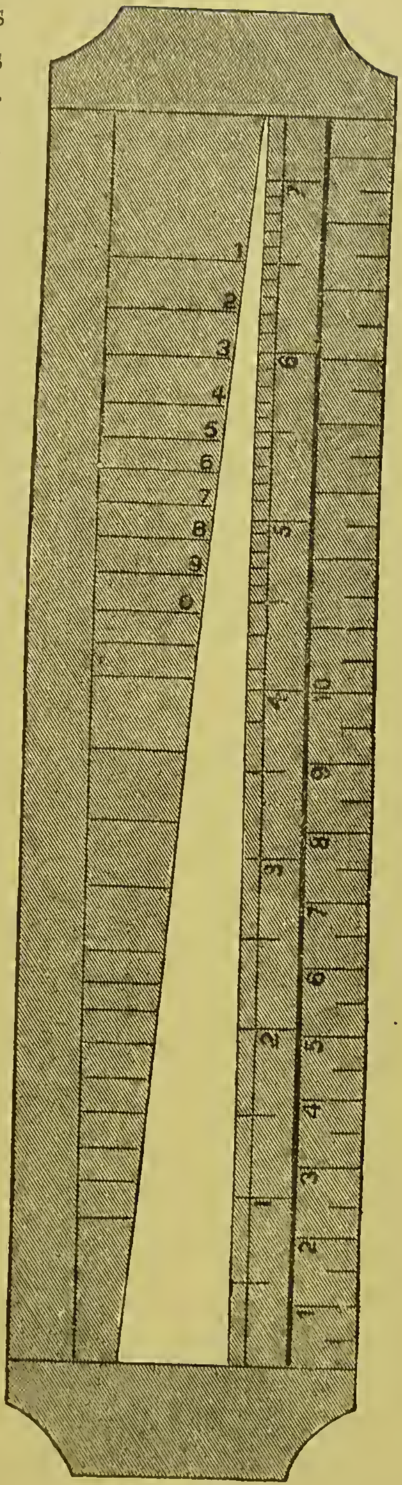

Fig. 13.

system of marking urethral instruments would not be so familiar to us in this country. It is not important to have catheters graduated so finely as this, as a smaller size will always do service for a tighter fit. With bougies it is our object to pass, almost imperceptibly, to increasing diameters.

The degree to which dilatation should be practised is a point of importance. The English make of instruments usually determines No. 12 as the limit. I prefer, as a rule, one or two sizes above this, but this to some degree depends on the natural dimensions of the entire canal. To avoid the meatus being kept on the stretch the whole time the instrument is being passed, I have my own bougies, above No. 10, made to diminish from the curve towards the handle. When we consider that in the employment of gradual dilatation we get little more than the stretching of the stricture, it is a matter of moment to ensure that it is sufficiently done, and this, in the majority of instances, is not accomplished by a No. 12 bougie. Harm is often done by passing bougies down to the face of a stricture without fairly entering it; in this way a pouch may be made below the stricture which adds to future difficulties that may arise. When practicable, instruct your patient how to pass a bougie for himself, as all modes of treatment subsequently require the occasional use of the instrument. In the case of gum-elastic bougies, it is well to caution persons against retaining them in their service too long, as they are apt to become brittle, and are then, of course, dangerous.

To patients who are very intolerant of catheterism, or in whom there is difficulty, from spasm, in passing an instrument, an anæsthetic may be administered with advantage. The A.C.E. mixture is well adapted for this purpose.

And now it will be proper to ask what we may expect from treatment by gradual dilatation. In the earlier forms of stricture, where the obstruction is soft rather than fibrous, the introduction of the bougie exercises a healthy stimulus on the part, and leads to the removal of the effusion producing the obstruction. In advanced stricture, where the adventitious deposit has become cicatricial or indurated, I fear dilatation will do no more than dilate. You can stretch the narrowed urethra to a size corresponding with the natural dimensions of the canal, and, in the majority of instances, by a moderate amount of persistence in treatment, you may keep it so stretched, but I have not been able to infer that absorption, under these circumstances, actually takes place. We all know that pressure produces absorption, but to do so, it must be continuous, and not interrupted. I conclude my remarks upon treatment by gradual dilatation by observing that it is adapted to strictures of recent date, and to those more advanced where the process is not intolerable to the patient, and the dilated condition may be maintained with a moderate amount of care.

I pass on to notice the treatment of stricture by what is called continuous dilatation, a method which possesses some advantages. It is based upon the observation that when a bougie is retained within a stricture sufficiently long to set up inflammatory action the contraction yields, so that within forty-eight hours or so a bougie several sizes larger can be passed: by the extension of this principle, dilatation, even of the tightest stricture, may be soon accomplished. Hence it is adapted to tight strictures where catheterism is attended with more than ordinary difficulty.

To carry out this treatment, a gum-elastic catheter is introduced, and retained by some contrivance. A convenient way of doing this is by a ring passed over the penis and secured to the body, the end of the catheter being attached to the ring. Mr. Furneaux Jordan prefers a bougie to a catheter for this purpose, the advantages of the former being—" a more rapid and complete dilatation, due to the hydrostatic pressure of the urine along the exterior of the bougie. A bougie is more easily introduced than a catheter.

When the finest bougie is once in, it need not be taken out—no slight boon; the ordinary acts of micturition are preserved; every kind of apparatus for keeping the bed dry, or for any other purpose, may be dispensed with." * There is a little device I sometimes employ, on the principle just mentioned, which will be found of service in opening up fine strictures and preparing them for ordinary dilatation, and it has the advantage of not confining patients to the house. It consists in passing a fine catgut bougie into the bladder, and securing it by a piece of plaster, and a finger bandage wound round the penis, so as to include the ends of a silk noose which retains the bougie in position. The patient passes water by the side of the catgut, which at the end of forty-eight hours can be withdrawn. By this time, the stricture is sufficiently dilated to admit a larger instrument, and then gradual dilatation can be proceeded with. Of course, if the patient cannot micturate with it in, it must be withdrawn. The same object, however, may be obtained by teaching the patient how to introduce it, and instructing him to keep it in a few hours daily.

In some cases of tight stricture it is found impossible to introduce a flexible instrument. The ordinary metallic catheter answers the purpose equally well, though it is not so comfortable for the patient, as it necessarily restricts his movements much more. The instrument being introduced, you should retain it until it moves with freedom. This usually occupies from forty-eight to seventy-two hours, and is attended with varying degrees of local action. When the bougie is changed, a larger one is substituted, and in this way a tight stricture may be dilated in the course of a few days. There are two precautions to be taken. First, the instrument must not fit the stricture too tightly, as nature invariably resents tension. Second, the end should only be just within the bladder, as if it exceed this, it is pretty sure

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* *Lancet*, Jan. 29, 1876.

to act as an irritant, and an attack of cystitis is to be avoided. I have never seen any serious symptom occasioned by the retention, for this purpose, of a soft bougie, but I have known perforation and peritonitis follow the prolonged fixation of a metal catheter within the bladder.

It is well to have the temperature noted when treating a patient by continuous dilatation, as a rapid rise in the thermometer indicates that the instrument should be withdrawn. If the kidneys are unsound, this "suppurative process" of treatment should not be tried. To soothe the restlessness which the restrained position sometimes occasions, morphia, in small doses, at regular intervals, may be administered.

In estimating the value of continuous dilatation, I have found its results compare favourably with those obtained by the gradual method. In the latter, it is only in the early stages of the disease that absorption is obviously promoted, in the later stages the stricture is merely stretched to the desired extent. In continuous dilatation I believe that not only is absorption favoured, but what is left of the stricture-material is less disposed to recontract.

If we could by any means, chemical, electrical, or otherwise, deprive the scar-tissue, of which strictures are composed, of its tendency to contract, we should effect more for the treatment of stricture than has hitherto been done. Working in this direction, some years ago, I published a paper in which I referred to some advantages I had found in the use of belladonna as a topical application to stricture.* This is a point which will again be referred to when I come to speak of the prevention of stricture, and its treatment by combined internal and external urethrotomy.

The treatment of stricture by excision of the cicatricial mass composing it has gradually been gaining ground. In the hands of M. Guyon and M. Horteloup* I have recently seen some admirable examples of this practice, which promised to be permanent. It is chiefly applicable to limited strictures of a contractile nature, such, for instance, as those consequent on laceration and wounds of the deep urethra. The operation consists in cutting down upon and dissecting out the portion of urethra involved in the hardness; this is usually done on a staff passed into the bladder through the contraction. In a case I saw operated on by M. Guyon, the excision of the stricture was facilitated by first making an internal section of it with Maisonneuve's instrument; this admitted a larger sized staff on which to dissect, the stricture being removed in two lateral portions corresponding with the division made by the urethrotome. Then the wound is closed on a full-sized bougie, the tissues covering the urethra being brought together in layers by catgut sutures until the skin is reached, which is treated in a like manner. In this way the wound is approximated and closed throughout its whole depth. A rubber drainage catheter, passed the entire length of the urethra, is left in the bladder. By these means I have seen the wound thus made closed by first intention in the course of three or four days. I have examined cases so treated at the lapse of some months after operation at the Necker Hospital, and found the improvement continue. Dr. Keyes, of New York,† has recently published a case where he was obliged to fill up the wound caused by the excision of an extensive stricture by the transplantation of a portion of a redundant prepuce. The man was sixty years of age. The graft succeeded, and the condition of the patient twelve months after the operation was found to be most satisfactory. Mr. Mayo Robson ‡ has also recorded an instance of treatment by excision which, under special circumstances, is quite worthy of consideration as now practised.

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* "The Therapeutic value of Belladonna in some Diseases of the Bladder and Urethra." By Reginald Harrison. *Liverpool Medical and Surgical Reports*, 1868.

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* *Brit. Med. Journ.* (Epitomes), May 21, June 4, Aug. 6, 1892.

† *New York Medical Record*, Sept. 17, 1892.

‡ *Brit. Med. Journ.*, vol. i. 1885.

Treatment of stricture by electrolysis is a method which hardly seems to have justified the anticipation with which it was heralded as a cure for this disorder. It is difficult to ascertain from the writings of some of its advocates the precise action that electricity, as applied under these circumstances, is desired to attain. As a cautery in removing the hardened tissue upon which some strictures depend, it has not only proved a failure, but the cause of additional obstruction. If as a tissue resolvent, depriving scars of their power to contract, it is curious that this action has not been utilised in the treatment of those hideous disfigurements which burns so often occasion, and where its action would be readily demonstrable. If its power is merely a functional one, such as in relieving spasm, and other morbid sensations to which strictures are liable, one can understand how under certain circumstances its action may be beneficial. This is probably the nature of the good it is sometimes capable of conferring. As Mr. Swinford Edwards observes, "the reason that strictures of the deep urethra are so amenable to electrolysis is, I strongly suspect, that they are so frequently partly spasmodic in character, and this element of spasm is allayed by contact with the negative pole, through which is passed a continuous current."* Probably this represents the truth of the matter. In the treatment of obstruction due to an enlarged prostate, as advocated by Dr. Newman, of New York, the same remarks will apply so far as I have been able to judge those cases where this process has been tried.

Those who are curious in regard to the many ways that have been suggested for the treatment of stricture and retention, will find interest in reading how hydraulic and air pressure, including suction, have been employed for this purpose.* The dilating of a stricture by air is referred to by Dr. Kerrison as having been utilised by the Egyptians in primitive days for the purpose of removing stones from the bladder.† I merely refer to such suggestions to say that in the case of stricture they are quite inapplicable, as their tendency, as well as that of all other forms of indiscriminate pressure, is to dilate the most yielding portion of the urethra, and that is not usually the point where it is strictured.

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* "Address on Urinary Surgery," *Medical Press and Circular*, Oct. 12, 1892.

The dilatation of stricture is commonly effected by the introduction of instruments from before backwards, exceptions to this being exceedingly rare. I have elsewhere alluded to Mr. Furneaux Jordan's suggestion, that advantage may be taken of the dilated condition of the urethra behind a stricture to reverse this order of proceeding, and pass the instrument from the bladder side of the obstruction towards the meatus urinarius; this Mr. Jordan has effected by an incision through the rectum. Similarly a case is recorded by Mr. Howse ‡ of severe traumatic stricture treated with a good result by the aid of supra-pubic incision into the bladder.

Mr. J. H. Morgan § also publishes an illustration of this practice. It was that of a boy with an impassable traumatic stricture of the urethra, complicated with two lateral urinary fistulæ through which all the urine oozed. The bladder was opened above the pubes on an inflated rectum bag, and a probe was passed from the bladder into the urethra until it was firmly arrested in its progress by the stricture in front. A perinæal incision on to the end of the probe was then made down to the point of the probe, and the mucous membrane was drawn down and stitched to the skin on either side of the incision. The bladder was closed and healed by first intention. So good a substitute for the whole-length urethra did the new channel prove that I am not surprised to read, "that he and his parents declined the suggestion of any further interference." It might have been possible, had it been desired, to carry the case a stage further in accordance with the practice referred to later on in connection with the restoration of the urethra. Such methods of procedure, however, are only to be entertained where, for some special reason, it is found impossible to attack a stricture from the front.

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* *Medical Record*, February, 1878. *Gazette Hebdomadaire*, No. 32, 1872. *British Medical Journal*, October 27, 1877. "Employment of Suction," by Dr. O'Connell, *Lancet*, March 2, 1872.

† "On the Dilatation of the Male Urethra by Inflation for Extraction of Calculi from the Bladder, as practised in Egypt near 2500 years ago." By R. M. Kerrison, M.D. *Med.-Chir. Trans.*, vol. xii.

‡ *Clinical Society's Transactions*, vol. xii.

§ *The Practitioner*, 1888.

Mr. W. Thomas reports a case * where, to remedy a congenital malformation of the urethra in a child, he explored the obstruction from a supra-pubic cystotomy, and was thus able to determine accurately the true line of the outlet of the canal.

The use of caustics in the treatment of stricture, which was in vogue at the commencement of the present century, has now been abandoned. I have occasionally used a weak solution of nitrate of silver to a hæmorrhagic stricture, just as I would do to a florid granulation, with the object of diminishing its tendency to bleed on the slightest occasion. To apply caustic as formerly, for the purpose of destroying or burning out a stricture, is at variance with the practice of the present day.

Hæmorrhage from the urethra is not an infrequent consequence of catheterism. When slight, it need not occasion any anxiety. In cases of granular urethritis it is difficult sometimes to pass an instrument without rupturing one of the minute blood-vessels, which are in a highly congested condition. I saw, in consultation, a case of hæmorrhage from the urethra, after catheterism, of an unusually per-

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* *Lancet*, Aug. 21, 1886.

sistent character. So exhausted was the patient that it became a question whether it would not be necessary to open the perinæum, and expose the urethra at the place where it was supposed to be injured. Before doing this it was suggested that the subcutaneous injection of ergotine should be given. After two trials the hæmorrhage entirely ceased. This patient appeared to have come from a family of "bleeders," a brother and a sister having died from hæmorrhage following trivial injuries. When the hæmorrhage is free and continuous, it may indicate that a false passage has been made, as the damage that is inflicted in this way is sometimes extensive. Not long ago, there was, in my ward, a case in which I had difficulty in passing a catheter for urgent retention of urine, in consequence of a false passage opening into the rectum, which had been made a few hours previously by a secret-disease quack. After I had succeeded in relieving the bladder, no further catheterism was necessary, and I delayed the passing of bougies for a fortnight. Fortunately, by this time, the false passage had closed, and treatment was proceeded with as usual.

A false route is usually made through the floor of the urethra, the operator allowing the point of his instrument to drop, and then, when a hitch occurs, as the more fixed portion of the canal is reached, exercising force. Under such circumstances assistance can often be rendered by the finger in the rectum.

When a false passage has been made, it is better to suspend further instrumental treatment for some days; there is but little risk of extravasation of urine occurring, as the direction of the laceration is contrary to that of the stream of urine. On resuming treatment, care should be taken to avoid the site of the false route, as by repeatedly opening it, it may be converted into a sinus. I pointed out the case of a patient who had an old false passage leading from the upper wall of his urethra; this was caused by the patient when using an instrument like a stylet, which he occasionally employed at sea whenever he considered that his stricture required "breaking down." I could pass a small elastic bougie into the false route, whilst another would traverse the stricture into the bladder. This case was satisfactorily treated by rapid divulsion. The good to which a false passage may be turned is illustrated in the following record I had from my friend, Mr. Cadge. The specimen is preserved in the Norwich Hospital, where I recently had the opportunity of examining it :—

Case.—As to the tolerance of instruments, even in an artificial canal, I may mention a *post-mortem* I made on a man who for five years had worn a No. 12 flexible rubber catheter day and night, and had gone about and transacted professional business fairly. He had an old stricture which nobody here or in London could get through. Forcible catheterisation was adopted; No. 12 was gradually passed, but it could never be left off, for the water came no better, and a perinæal fistula never healed. When he died, I found that the catheter had gone not through but alongside the stricture, and, instead of entering the urethra behind the stricture, had bored a hole through the prostate, and made a separate aperture in the bladder. This false canal answered well, and was lined by a polished membrane.

In catheterising persons suffering from forms of paralysis where the bladder is involved, care must be taken not to damage the more or less insensitive urethra. I have known cases where the deep urethra has thus been injured and the atonied bladder become largely distended with blood, a distension which the paralysed patient has been unconscious of until it has attained considerable proportions. It must be remembered that the power of the bladder to firmly contract is one of the best safeguards against bleeding proceeding from the deep urethra; where this power is in abeyance the consequences of even slight accidental lacerations during catheterism may thus be rendered very disastrous. In a case of this kind I saw in consultation, where the bladder of a paralysed patient became distended with blood and clots, after emptying it, I tied in a soft catheter and exercised pressure over the bladder with a pad and binder, with good effect. This was combined with the subcutaneous injection of fresh ergotine.

FIFTH LECTURE.

On Toxic Urine in relation to certain Surgical Operations on the Urinary Organs—Urinary Fevers—Treatment.

It is impossible to study cases of internal urethrotomy without recognising that, apart from their surgical interest, they may be regarded as valuable physiological experiments in relation to some unworked-out problems connected with animal chemistry. Until recently it may be said that certain events following upon interference with the male urethra remained practically unexplained.

Some important communications have, from time to time, been made in reference to this subject, and amongst these I would mention one by my former colleague, Mr. Mitchell Banks.* This paper led me to alter my practice relating to the treatment of certain strictures of the urethra, and brought about some modifications in operating which I venture to believe have some bearing upon the remarks I am now making. Though the conclusions arrived at do not entirely correspond with those contained in the paper referred to, I feel we are indebted to the author for placing the matter in such a light as to furnish material for further suggestion.

The practice of dividing a stricture by an internal incision is almost invariably followed, at an interval of somewhere about three hours, with a rigor, and the subsequent development of more or less constitutional fever. These attacks are liable to recur; they differ in degree, in some instances being mild, whilst in others they may be severe or even fatal in a few hours. Various explanations for these phenomena have been offered. That such symptoms have little or nothing to do directly with the pathological state of the kidneys is clear from the fact that they are observed and have proved fatal in individuals whose kidneys were *sans reproche*. That the state of these organs may determine the intensity of the pyrexial attack is not unlikely, but that it can cause it is obviously opposed to observation. Nor is it probable that such effects are due to direct nerve lesion. Injuries to nerves are immediately followed by such anatomical or physiological signs as the nature of the lesion is capable of producing. If a man's brain or spinal cord is damaged by a blow or shock, he shows signs of concussion or nerve traumatism upon the receipt of the injury, and not three or four hours afterwards. Again, if it is a nerve lesion of the urethra which is the primary cause of the phenomena following, why do we not see urethral fever after far more extensive injuries involving nerves, such as lithotomy and other equally great operations? The improbability of urethral fever after internal urethrotomy, catheterism, and such like, being due to nerve shock, is indicated by other considerations which may be noticed. In the first place, we should expect such symptoms to follow Holt's operation for stricture as frequently and severely as after section of the stricture from within. On the contrary, rigors and fever are far less common after dilatation with rupture than after internal urethrotomy—divulsion or stretching is less productive of urinary pyrexia than incision. The position of the wound also in internal urethrotomy exercises a determining influence in the production of these symptoms, as they seldom follow when the section is made on the roof of the canal, as compared with the floor. Further, when a catheter is worn for a time immediately after the internal urethrotomy, and drainage of urine is carefully carried out, a considerable proportion of cases escape attacks of urethral fever. In looking over the notes of my cases of internal urethrotomy, it struck me, as worthy of remark, that neither rigors nor fever usually showed themselves until after micturition had been naturally practised, or urine had found its way into the wounded urethra. Such considerations led me to believe that these rigors and fever were symptomatic of poisoning rather than of shock.

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* *Edinburgh Medical Journal*, June, 1871.

Adopting this view, I resolved to perform a series of operations in suitable cases, where, though internal urethrotomy was practised, no urine was allowed to remain in contact with the freshly made wound. This involved an external perinæal urethrotomy being done immediately after the stricture had been divided from within, so as to allow the urine to drain away as rapidly as it was excreted. I published a series of cases,* since added to, where the double proceeding had been practised, with the object, not only of preventing urine lodging and being absorbed by the wound, but, at the same time, of permanently improving the condition of the stricture. From these combined operations of external and internal urethrotomy I soon learnt how it was possible to produce rigors and fever at will. So long as the bladder drainage of urine through the external perinæal wound was free and uninterrupted, they were absent; if these conditions were not fulfilled, either by a flaw in the drainage wound or the apparatus, I could explain their appearance.

It seems important that we should recognise the different conditions under which the surgeon has to deal with wounds exposed to the action or influence of urine. Healthy urine may be regarded as absolutely innocuous when it can make its way over a fresh cut surface, or out of a cavity, as uninterruptedly as it flows; on the other hand, when it is pent up, as in a wound or space, it is both destructive and poisonous. We must note how favourable are the conditions for producing urine fever after internal urethrotomy. The division of the contraction necessarily paralyses the urethra to that extent, and the process of repair is carried on with the wound soaked in the urine that is left to stagnate after each act of micturition. This is a very different condition from the incontinent flow of urine over the glazed and granulating open wound of a lithotomy or of a perineal section. In one it is merely contact of urine with open spaces, in the other, retention, and probably chemical re-arrangement, within a space bounded by a freshly made wound. My direction and kind of work thus led me to believe that the urine could provide septic material necessary for the production of urinary fever. It was with considerable interest therefore that I perused the communications bearing upon this subject made by Dr. Bouchard, of Paris, and I also had the advantage of seeing some of his experiments and tests, which he was good enough to show me at the Hospital Lariboisière. I am indebted to Dr. A. Barron for kindly preparing the following digest of Dr. Bouchard's papers bearing upon this subject:—

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* "On the Treatment of Urethral Stricture, by combining Internal and External Urethrotomy," *British Medical Journal*, July 18, 1885.

In 1882, in a note* presented to the Société de Biologie, Bouchard showed that alkaloidal substances were constantly present in the urine in certain infective disorders, and that these alkaloids were of intestinal origin; that is to say, that they were substances produced in the intestinal canal by the growth of the vegetable organisms therein contained, also that they were analogous to the *ptomaines*. Subsequently these alkaloids were found to be present in normal urine. Bouchard found the same alkaloids present in the fæces, and he divided them into two groups—(*a*) those soluble in ether, and (*b*) those soluble in chloroform. He found that, when present in large quantities in the fæces, they were also present in proportionally large amount in the urine, and this applied to the ether and chloroform groups respectively. This first paper may be summarised as follows :—

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* "De l'origine intestinale de certains alkaloides normaux ou pathologiques," par Ch. Bouchard, *Rev. de Med.*, 1882, tom. ii. p. 825.

1. In health, alkaloids exist in the living subject.

2. These alkaloids arise in the intestinal canal through the action of putrefactive intestinal organisms.

3. The alkaloids of normal urine represent a fractional part of these intestinal alkaloids, absorbed by the intestinal mucous membrane, and excreted by the kidneys.

4. Diseases augmenting intestinal alkaloids augment *par consequence* the urinary.

In the next paper * he determined the effects of normal urine on rabbits, and found that the same doses produced different effects according as the individual furnishing the urine was in health or not; also that the toxicity varied in different individuals, and that the symptoms depended on several distinct substances. He proved by experiment that the symptoms were not due to the water of the urine, nor to the urea, uric acid, creatin, salts, or volatile matters. Further, that the alkaloids soluble in alcohol differed in their effects from those insoluble in alcohol, and that, although there might be five or six different substances present, they could symptomatically be arranged in two groups, a convulsive and a narcotic, and he concluded that the symptoms in different cases of uræmia might be explained by these groups being present in the blood in varying proportions.

Recently Bouchard has brought forward some further facts with regard to the urinary alkaloids and their properties.† He defines a *toxic*, or a unit of poisonousness, as that amount of poison required to kill one kilogram of living matter, *e.g.*, of rabbit. The *urotoxic* is that quantity of urinary alkaloids capable of killing a rabbit weighing one kilogram. The symptoms of urinary toxæmia produced by introducing urine into the veins of a rabbit are, in the order of their occurrence—

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* "Recherches experimentales sur la toxicité des urines normales," *Comptes Rendus*, Dec. 6, 1884.

† "Sur les poisons qui existent normalement dans l'organisme et en particuliere sur la toxicité Urinaire," *Gazette Hebdomadaire*, April, 1886; "Sur la variations de la toxicité urinaire pendant la veille et pendant la sommeil."

"Influence de l'abstinence, du travail musculaire, et de l'air comprimé sur la toxicité urinaire," *Gazette Hebdomadaire*, May 19, 1886.

1. Contraction of the pupil.
2. Acceleration and diminished amplitude of the respiratory movements.
3. Increase of urine.
4. Fall of temperature.
5. Diminution and finally abolition of reflexes.
6. Convulsions, usually with coma, and
7. Death; the action of the heart and the electro-contractility of the muscles persisting for a time after death.

The fall in the temperature is due, not to the increase in loss of heat, but to a diminution in heat production. The urotoxic coefficient in man is ·465; in other words, for each kilogram of bodyweight enough poison is excreted in twenty-four hours to kill ·465 grams of living matter, or in two days and four hours a man excretes enough to kill himself.

During eight hours, if asleep, only from one-quarter to one-half as much poison is excreted as during the same period when awake. If the whole day be divided into three periods of eight hours each, the proportional quantities of poison excreted are—sleep, 3; early waking period, 7; late waking period, 5. The urine of the sleeping and waking hours also differs qualitatively as well as quantitatively. The alkaloid of the urine of sleep is *convulsive*, that of the waking urine *narcotic*. The urinary poisons of the sleeping and waking hours are not only different, they are physiologically antagonistic.

Fasting increases the toxicity of the urine, probably because then the individual lives on his own tissues, and these are relatively more difficult of oxidation than the ordinary food, and are less completely oxidised. Labour greatly diminishes the toxicity of the urine, as does also the breathing of compressed air.

Apparently opposed to the views I have advocated, that toxic urine is the cause of urinary fever, may be urged the following considerations: How is it that such symptoms are not produced when urine, often ammoniacal, is subcutaneously forced amongst the tissues, sometimes in large quantities, as in cases of stricture and sudden urinary extravasation? and secondly, how does it happen that the same symptoms have been produced in sufficient intensity to cause death within a few hours, where there is no evidence to show that the urethra has been actually wounded by the catheter or bougie?

The conditions attending subcutaneous urine extravasation differ from those associated with the continuing contact of urine with a wound in the urethra, as in internal urethrotomy. A mixture of blood and urine seems likely to produce different compounds from those that extravasated urine alone yields. Nor are we entirely to lay aside the consideration that, whatever *materies morbi* may be found at the seat of the wound by the conjoined decomposition of stagnant blood and urine, its entrance into the circulation may be favoured by the contractile power of the bladder from behind. When urine is extravasated amongst the tissues, its action is that of a virulent local poison, under the influence of which the contiguous tissues are killed outright, probably before they can exercise any power of absorption. Such a conclusion seems likely from some of Menzel's experiments, where putrid and normal urines were subcutaneously injected into various parts.

The second objection is based on the observation that cases are recorded which have proved rapidly fatal from urinary fever, where there is no evidence that the urethra has sustained any appreciable lesion. This is a statement which should be received with considerable reservation. Though the operator may not be conscious of having inflicted a lesion in the urinary passage with an instrument he has been using, nor the patient show evidence of it, this by no means implies that the urethra is uninjured. A mere abrasion of the epithelial lining of the canal is quite sufficient to permit of urine absorption to take place.

I have seen a few cases where it has been found necessary to tap the bladder with the aspirator above the pubes. In some of these this proceeding was not resorted to until, in attempts to get in an instrument by the natural passage, much damage had been done to the urethra, in front of the stricture. In none where puncture of the bladder had to be subsequently performed could I discover that the patients suffered from urinary fever. Here, though there was considerable injury, there was no access of urine to the wound.

In addition to the ordinary forms of wound fever, as well as the extraordinary fever of the half-emptied septic-made bladder, about which we have heard so much in connection with catheter fever, there are two other varieties which will be met with. The one is malarial, and is only seen in persons who have suffered in this way, possibly at some remote period of their lives. It comes on, as a rule, shortly after the instrument is passed; it bears no relation to the passing of urine; it is amenable to ordinary treatment by quinine, and can generally be prevented by giving the patient a third of a grain of morphia subcutaneously an hour before the instrument is passed. In the same way, I have seen these attacks caused by the introduction of the finger up the rectum in making a prostatic examination.

The other variety of febricula is sometimes seen when a patient passes water along the whole length of the urethra for the first time after lithotomy. Similarly this has also happened after prostatotomy. In one instance it was more than a rigor, it was a convulsive movement, which lasted for several minutes, and was followed by a rise in temperature. The patient believed his attack was due to what he described as "the consciousness of a new sensation,"—he should rather have said that it was the revival of an old one after six weeks' absence.

In connection with these observations a passage from the address, entitled "Medicine of the Future," which was to have been delivered by Dr. Austin Flint, of New York, at the Annual Meeting of the British Medical Association in 1886, is of interest:—"Analytical chemistry carries investigation beyond the limits of microscopical observation. The latter, at the present moment, both in pathology and physiology, seems to promise most; but is it not a rational anticipation to look for future results from chemical analysis of the components of the body, in health and disease, which in brilliancy and practical utility may surpass those of the labours in this field of investigation during the past half-century? The medical semi-centenarian can recall the enthusiasm aroused by the labours of Liebig. Histology is now in the ascendant, but it is safe to predict that before the lapse of another half-century there will be another era in organic chemistry, and that light will penetrate dark recesses which histology cannot reach. . . . The supreme objects of study in pathology at the present time are the discovery of micro-organisms and their natural history. But these agents, it is probable, are pathogenetic, not directly, but indirectly, by means of the toxical products of their activity. What are these products, and how do they give rise to the phenomena of disease? We may ask the same question of certain of the poisons introduced from without the body. How is it that fractional quantities of morphia, hyoscyamin, strychnia, aconitia, atropia, and other alkaloids produce their lethal effects? It conveys no adequate information to say that they act upon the nervous system. This is merely the statement of a fact, not an explanation.

For the latter we must look to the organic chemistry of the future."

The view that urinary fever is due to the development and propagation of bacterial life has recently been put forward with much force by Dr. Noël Halle,* in an able and exhaustive communication. Clinical and laboratory evidence is supplied in support of this proposition, and much stress is laid on the fact that there is no better medium for the cultivation of bacteria in the very centre of the urinary apparatus than is to be found in the residual urine which is so frequently present in the bladders of elderly males. I ventured to point out that the direct bacterial origin of urinary fever must be received with some reservation. The conditions under which wounds involving the urinary apparatus can be inflicted without exposing the individual to an attack of urinary fever, are precisely those which are inimical to the development of bacterial life. In going over, for the purpose of this discussion, a somewhat extended experience in all kinds of operations on the urinary organs, including the use of catheters and bougies, I cannot recall a single instance of what would now be called catheter fever in which proper provision was made for urine drainage, though such a proceeding would necessarily imply the doing of something more surgically than merely passing an instrument along the urethra into the bladder.

I will add a word or two about treatment. I believe the indications are those which would be applicable to patients showing symptoms of urinary intoxication in its acute form.

Persons suffering from kidney disorder, which is a frequent concomitant of stricture, are more liable to rigors and fever than those who are not. Such individuals feel the effects of shock more acutely than others, and consequently, in these cases, we must limit surgical interference to what is necessary for the preservation of life, regardless of other considerations. We are again reminded of the importance of making an examination of the urine in all cases in which we are about to treat a stricture. No cases are so much benefited by the preliminaries usually employed with patients about to undergo a surgical operation as these, and, when circumstances are not pressing, they should not be dispensed with. In the treatment of rigors and fever, I can endorse the favourable opinion which has been expressed as to the efficacy of aconite and quinine. The former is often a prophylactic when administered in two-minim doses of Fleming's tincture immediately after catheterism, as first suggested by Mr. Long. It is a good plan to sterilise the urine by the administration of from five to ten grains of boric acid every four hours for forty-eight hours before an instrument is passed.

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* Congrès Français de Chirurgie *(Transactions)*, Paris, 1892.

The most serious aspect of urethral fever has reference to the excretion of urine. In the slighter cases there are no appreciable changes in the urine, but in the severer forms it may be albuminous, sanguineous, or even completely suppressed. The suppression is best met by acting upon the skin, and arousing perspiration by vapour baths, or, where this cannot be done, by placing the patient for a few minutes in a hot bath, and then enveloping him in warm blankets. Dry cupping over the kidneys should also be employed. For its diuretic action, Gouley recommends that a teaspoonful of the fresh infusion of digitalis be given every hour or two, the effect on the circulation being watched. This has proved of much service. The subcutaneous injection of pilocarpine has also been given with advantage.

To sum up: If you want to avoid absorption of noxious material in cases of catheterism, take care to use clean instruments with no contaminating influences in their interior, and, when the urine has been removed, see that the bladder is not left in a septic condition. What must be the physical state of an old man's bladder which for months or years has been accustomed to hold pints, when its contents are suddenly withdrawn? If it is thus emptied, a suitable fluid should be substituted for urine until the flaccid walls of the viscus have somewhat regained their tone. Many bladders require to be as carefully antisepticised as a chronic abscess. If attention to these and other points arising out of them were more generally insisted upon, we should hear but little of catheter fever.

Apart from the question of fever, it must be remembered in practice that occasionally a high and otherwise unexplainable temperature means a more or less distended bladder. I have met with several instances of this in persons with some slight stricture, or with a commencing ataxia, who only required a catheter passing to dispose of this symptom. In one case I recently noted there was a daily rise to 105°.

SIXTH LECTURE.

Retention of Urine — Catheterism — Impassable Stricture — Aspiration of the Bladder — Tapping — Cock's Operation — Retention in Children.

Of all the operations in surgery, there is none, perhaps, that affords such immediate relief, or calls forth greater gratitude from the patient, than the successful use of the catheter for retention of urine. This is the most painful accident that can happen to a patient who is the unfortunate subject of stricture. Usually it is spasm upon organic stricture, or a plug of mucous after an excess of some sort that occludes the narrowed urethra, and converts difficult micturition into complete retention. In elderly persons especially, an attack of this kind is often brought about by what is commonly called "catching cold," when the action of the skin is checked and more work is thrown on the kidneys, to which some degree of local congestion is superadded. I need hardly remark that a person may be passing urine while suffering from retention, that is to say, his bladder is constantly more or less distended. The diagnosis of this condition is generally so simple that it is sufficient merely to mention it to prevent it being overlooked. Circumscribed distension above the pubes, and pressure within the rectum, serve to indicate to the touch that which usually the patient is only too conscious of. The degrees of distension are, of course, various. If one man is so insensitive as only to require relief by the catheter when his bladder reaches the umbilicus, we must not infer that another less needs assistance because this line is not attained. Our powers of endurance in this respect are different. The patient with the small contracted bladder, from long-standing stricture, suffers all the horrors of retention long before the former limit has been reached.

Treatment of retention is resolved into two heads: first, where a catheter can be passed; and, second, where it cannot, or its use is impracticable. Where retention is urgent, it is the duty of the surgeon at once to attempt catheterism. If he succeed, relief is immediate, and attention will be turned to the removal of the cause. Where the case is not pressing, a hot bath and a dose of laudanum frequently produce the desired effect. As a rule, an ordinary catheter, flexible or metal, should first be tried without delay.

There is much variety in the make of flexible catheters. Where there is a stricture causing retention, you desire to find an instrument which will pass through the narrow portion of the canal without damaging it. The general statement sometimes made to the effect that a large catheter will often pass where a smaller one will not, is, under these circumstances, about as applicable as it would be to say that a tight boot is better than an easy-fitting one. The different kinds and sizes of bulbous-headed soft catheters, particularly the smooth, highly polished, silk web ones, are usually excellent for this purpose. So are, where there is retention with little or no stricture, the rubber catheters with the velvet or depressed, not the punched-out eyes. The sharp edges of the latter openings sometimes cause a little pain and hæmorrhage as the catheter is withdrawn, and are not to be selected. The rubber catheters are apt to swell, so that after a week's use, a No. 7 may be transformed into an 8. It has been found that where there is much spasm these yielding rubber instruments require too much "kneading" to get them into the bladder. When this is the case Mr. Thomas Smith's modification, as made by Messrs. Maw, where some stiffening is introduced into the shank, will generally be found to meet this objection.

I would observe, in connection with the selection of catheters for regular use, that there should be some correspondence aimed at between the evacuating power of the instrument employed and the ordinary condition of micturition in the individual concerned. What can be worse, for a person who has been accustomed to ooze or dribble his urine for years, than to be suddenly put upon a system enabling him to accomplish the act of micturition in half the time and with double the stream it would occupy a man in possession of a normal urethra and bladder? I am sure this is a cause favouring the loss of bladder power and retarding its return when temporarily suspended. This is a surgeon's duty to see to, and not an instrument maker's. Nature will not maintain muscle if it is not wanted, or is unnaturally used.

It must be a matter of common observation, as Mr. Wagstaffe* remarks, that the normal outflow of the urine "is always perceptibly spiral." Possibly the bladder, in a yet unascertained way, suffers from the withdrawal of an action on the part of the urethra which has no counterpart where the catheter is used. In a rifled cannon it is not merely a question of powder.

Where there is much difficulty in getting through a stricture, a steel probe-pointed catheter (Fig. 14) will be found useful. Being metal, it is rigid, and under the control and direction of the operator. It increases in size from the end towards the handle, on the principle of the wedge. Before concluding that it is impossible to pass a catheter, I

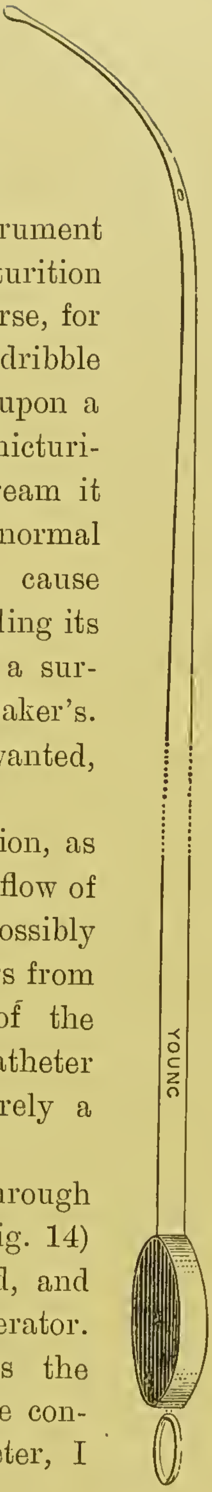

Fig. 14.

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* *St. Thomas's Hospital Reports*, vol. xv.

should advise a trial of the whalebone filiform guide and a tunneled catheter as previously described. They are of very little use, however, if the canal has been damaged by former attempts.

In all cases of retention, let me urge the importance of making a careful and well-directed effort to give relief to the patient in the most effective and speedy manner—namely, by the introduction of the catheter. In but a few will you fail; it is only after such a trial has been made that you are as a rule justified in entertaining other proposals. If an anæsthetic is necessary do not hesitate to give it.

Turning to those cases where catheterism is not safely possible, we find ourselves provided with various expedients. Supra-pubic puncture and aspiration of the bladder has been advantageously employed in this class of cases, of which the following are examples:—

Case I.—In 1876, W. F., aged 44, was admitted suffering from a stricture, the result of an old injury. On several occasions he had been unable to pass water, and much difficulty was found in relieving him. Recently his stricture had become tighter, so much so that now the urine only escaped in drops. When I saw him at the time of his admission, his bladder was distended, and he was in urgent want of relief. I found an old scar on his perinæum, and considerable induration. An endeavour to pass a small metal catheter was futile. As the abdomen was tense and the patient in distress, I punctured with the aspirator above the pubes, and removed three pints of urine. The patient was placed in a warm bath, and had a full dose of laudanum. The urine began again to issue naturally in drops, and no further retention followed. He was kept in bed for four days, during which period no attempt was made to pass a catheter, nor was this necessary. I subsequently dilated the urethra until I could pass Holt's instrument, when I ruptured the stricture. In three weeks the patient left hospital, being able to pass a No. 12 for himself.

Case II.—W. W., a sailor, was admitted on April 24th, 1874, for retention. He had suffered from stricture for three years, and for some time the stream of urine had been diminishing in size. Twelve months previously, when at sea, he had retention, and was with difficulty relieved by the catheter. On admission the bladder was largely distended, and catheterism was ineffectually tried. I punctured the bladder above the pubes with one of the small needles of the aspirator, and removed a basinful of highly coloured urine. The patient was relieved, and, after a dose of laudanum, commenced to pass urine naturally in a small stream. On the fifth day after admission, a No. 3 bougie was passed through a long and tight stricture. From this date dilatation was employed, and on the 12th of May, when he was made an out-patient, it had proceeded as high as No. 8. Here, rest and withdrawal of tension rendered treatment and natural urination again possible.

It may be asked, was it impossible to introduce a catheter? I would not like to admit this in any case, for, assuming an average amount of dexterity, such an operation, in the greater number of strictures, is a matter of perseverance only. But what may be possible is not always expedient. In cases of considerable mechanical difficulty it is easy to do a great deal more damage with a catheter than with an aspirator needle, and thus to retard rather than facilitate progress towards recovery. Though some regard it in the light of a point of honour to pass a catheter under all conditions where retention occurs, I cannot share this sentiment with them.

A large number of well recorded cases show the safety with which the aspirator may be used. With a fully distended bladder it is almost impossible to injure the peritonæum, and if the finger is for a moment pressed firmly above the pubes before the instrument is introduced, until a pit or depression is formed, the passage of the needle is nearly painless. My observation would confirm the remark of a patient recorded by Mr. J. Bell,* "that it was the easiest way of having the water drawn off he had ever experienced."

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* *Edinburgh Medical Journal*, April, 1874.

That aspiration may be repeated almost indefinitely is evident from cases such as those recorded by Mr. W. Brown, where, for retention from an enlarged prostate, it is stated, "we used the aspirator daily, and on some occasions the pain was such as to require the operation to be performed twice in the day. Altogether we performed the operation fifteen times, with immediate relief on every occasion, and without the smallest inconvenience or injury from the punctures or perforations of the needles." * More recently, Dr. J. T. Hague remarks: "This patient—an old man of ninety—passed no water *per urethram* for five weeks, during which period he was aspirated thirty-four times, and had neither cystitis nor peritonitis; the only discoverable ill-effect being an inflammatory thickening about the seat of the numerous punctures." † Eventually Dr. Hague succeeded in passing a soft catheter. Possibly during this long interval of inactivity the prostate underwent some shrinkage.

In tapping the bladder with the aspirator there are two points to be remembered: (1) only to use a fine needle, and (2) to keep near to the bone, and so avoid puncturing the peritonæum. The line at which the reflection takes place is variable, but a space of at least half an inch usually exists above the pubes where the needle may be introduced with safety. This area is increased when the bladder is distended. It has been pointed out by Dr. Macfie Campbell that aspiration may be followed by urinary extravasation along and around the puncture of the aspirator trocar, and he records a case where this happened.‡ I think, however, it is a contingency which is not often likely to occur.

Mr. E. H. Howlett has advocated a post-prostatic method of tapping the bladder in the following words §:—

"To perform the operation, the patient is placed in the lithotomy position, and, if the bladder be contracted, it can be filled from the

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[*] *British Medical Journal*, May 23, 1874.

[†] *Lancet*, Aug. 29, 1885.

[‡] *British Medical Journal*, Feb. 21, 1880.

[§] *Ibid.*, Feb. 13, 1886.

urethra in most cases. The forefinger of the left hand is then passed into the rectum, and made to explore the prostate and inferior surface of the bladder. Some sort of idea can then be formed of the distance the trocar will have to travel to reach the bladder, and the direction. The forefinger being retained in the rectum, a trocar and cannula, of the size of a No. 12 catheter, is thrust through the skin about three-quarters of an inch in front of the anus, and slowly pushed on until resistance is felt to have disappeared; the trocar is then withdrawn and the bladder emptied. The subsequent steps of the operation require no description. In my cases, the metal cannula was maintained, but it would be better to pass through it into the bladder a No. 8 red elastic tube, and withdraw the cannula. It is a great advantage to be able to introduce so large a tube, as the chances of its becoming blocked are reduced to a minimum. Finally, to make the patient comfortable, a tube is attached to the catheter, and the urine drained into a bottle. To retain the catheter, Mr. Appleton, of Beverley, devised a very simple apparatus. It consists of a triangular piece of thick leather, with a hole in the centre, through which the catheter passes. One small hole behind, and others at either of the front corners, permit the tapes passing, which are attached to a belt round the loins."

This description is illustrated with two cases. As I have not had an opportunity of practising this operation, I can only say that it appears a feasible proceeding.

Tapping the bladder above the pubes, or through the rectum, are expedients which, like aspiration, are only to be resorted to where there is a prospect of re-establishing within a short period the natural passage along the urethra. Puncture of the distended bladder above the pubes with a penknife, or similar instrument, has been practised by sailors and others who have found themselves urgently suffering from stricture and retention when beyond the reach of professional assistance. In some instances I have seen a permanent fistula has been the result of this, whilst in others the opening has closed when the natural function of the urethra has been restored.

The chief objection to the older methods of tapping by the rectum or above the pubes is that they require the retention of the cannula within the bladder for some days. This is not only a source of discomfort to the patient, but the former proceeding is not free from the risk of infiltration of urine and permanent fistulous communication between the bladder and the rectum following. Tapping the bladder from the rectum may now be regarded as an obsolete operation.

Where the chance of restoring the urethra is only remote, as in some chronic cases of stricture, Cock's operation of tapping the urethra at the apex of the prostate may be resorted to with advantage where urgent retention occurs. I occasionally see a patient upon whom I performed this operation many years ago. He had endured all the vicissitudes that could happen to the subject of a bad stricture, but since this operation he has enjoyed perfect health and comfort at the expense of micturating through the perinæum. Cock's operation is so well known that I need not further refer to it.*

"Forcing a stricture," that is to say, taking a chance at the line of an obstructed urethra with a catheter, is a proceeding so likely to be attended with disastrous consequences as not to be entitled to recommendation. If you cannot pass an instrument by the exercise of a legitimate amount of firmness and tact, you are pretty sure to do harm by such haphazard manipulations.

A few words will not be lost in urging the importance of after-treatment in all cases of retention requiring relief by the catheter or its alternatives. Many persons owe years of misery to the fact that, after this, the bladder and associated parts have never regained their former power. Under such circumstances it is obvious that careful and regular catheterism should be employed until the powers of the patient are restored. Recovery will be assisted by the use of strychnia, nux vomica, cantharides, and galvanism, all of which at times are found useful in helping to restore the tone of the bladder. Then there are cases where the paralysis from retention is only partial, the patient not being able to completely empty the viscus. These are the instances which are sometimes overlooked until the urine becomes offensive. Here the bladder after its distension requires help with the catheter, and with tonics for some time until its function is re-established.

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* *Guy's Hospital Reports*, 1866.

There are also cases of retention so extreme and prolonged as to induce more or less sloughing of the lining membrane of the bladder from pressure and stretching. I have had such a case under observation where, from what was passed by the urethra, we had reason to believe that the patient lost the whole of the mucous membrane of his bladder. Gradually the power of micturition returned, and he recovered. I refer to these points to show that we have not always completed our work when we have administered to the urgent necessities of a patient suffering from retention. Prostatic retention will be referred to later on.

Retention of urine in young male children is not unfrequently due to the impaction of a calculus, and in this way also extravasation of urine may be caused. That it is sometimes occasioned by a constriction which has encircled the penis, instances such as those recorded by Mr. Christopher Heath * and Mr. Ewers † remind us of. Here strangulation had been caused by fine hairs, which, having wound themselves round the penis, had become embedded in œdema. Mr. H. Taylor ‡ also publishes an instance where a piece of sewing cotton thus caused an appearance resembling a paraphymosis.

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* *British Medical Journal*, Oct. 27, 1888. † *Ibid.*, Dec. 1, 1888.
‡ *Ibid.*, Dec. 15, 1888.

SEVENTH LECTURE.

Cases not suited for Dilatation—Question of Operation—Internal Urethrotomy and its Management.

In a previous lecture I have expressed my belief that, where it is practicable, gradual dilatation by bougies is the best treatment for by far the larger proportion of urethral strictures. This belief is confirmed by the examination of a number of instances, extending over many years, including cases operated on in different ways and by different surgeons both at home and abroad. For some time I have made it a practice to carefully inquire into the history and treatment of every stricture case that has come under my notice, both in hospital and privately. I need hardly say that the information thus acquired has proved useful in determining the actual value of almost all the proceedings which have from time to time been brought before the profession for the treatment of urethral stricture and its complications. Though, as I have already said, the treatment of stricture by the simple process of dilatation is probably the one that is most generally useful, it cannot be regarded as of universal application. You will meet with strictures that will not dilate; strictures which, when dilated, recur in spite of a continuation of the process; and strictures which will not admit of dilatation by reason of the symptoms which arise in the course of the treatment. These are examples I have met with in the practice of other surgeons where it would be impossible to take exception to the manner in which the process was carried out. To meet such cases as these, various methods of treatment have been suggested for improving the immediate results, and rendering those results more enduring. Of these, internal urethrotomy has held, and at present holds, a prominent position. It is to the consideration of this operation that I shall now proceed.

To divide a band of cicatricial tissue which narrows the urethra down to perhaps the size of a pin-head, so that in a moment it will permit the introduction into the bladder of a full-sized bougie, and at the same time to be conscious that this can be accomplished with the same precision as if done on the external surface of the body, seems at first sight to offer the most rational method of treating this affection. And so undoubtedly it would prove to be were it not open to two objections, which to my mind, at one time, seemed to weigh against it. These were:—first, that the operation was not unfrequently followed by the development of rigors and fever, which we were then unable to prevent; and secondly, because the benefit was not invariably permanent. The former objection has been discussed in a previous lecture in connection with my remarks on toxic urine; the latter will require some further notice.

I am disposed to limit the performance of internal urethrotomy to cases of penile stricture, and to those of contraction in the deep urethra where, for the reasons I have just adduced, gradual dilatation is proved to be impracticable. Later on I shall describe more fully the method of operating.

In contractions of the meatus of the urethra, I usually make an incision in the median line, directly downwards. In strictures further up the canal, but within the penis, division may be performed with the *bistouric caché*, or with a probe-ended knife (Fig. 15), which I have found useful for this purpose.

In the deep urethra division is not so readily accomplished. For its performance we are provided with two kinds of instruments—viz., those cutting from before backwards, of which Maisonneuve's and Teevan's urethrotomes are examples, and those doing so in an opposite direction, such as Watson's and Civiale's. Of the latter variety I find that Watson's is the best.* In principle it resembles the staff used by Syme, to which is added a knife concealed in the narrow portion of the guide, in front of the shoulder, indicating the position of the stricture to be divided (Fig. 16). The protrusion of the knife is regulated by a screw at the handle, and a dial attached to the screw indicates the degree to which the knife is projected.

I have been using a urethrotome which is somewhat different from the instruments figured in text-books. It consists of an anterior portion, sufficiently small to pass into narrow strictures, on to which a filiform guide can be screwed, and an expanded part, corresponding in size with a No. 10 bougie, and terminating in front in an abrupt shoulder. Within the broad portion is contained a lancet-shaped knife, which is made to project and run along a slit in the narrow part of the instrument by a spring, and is regulated by a screw. In the accompanying drawings the instrument is represented closed (Fig. 17), and with the knife projecting (Fig. 18) as for the division of a stricture. It will be seen that the urethra is divided at the

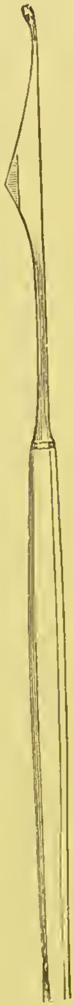

Fig. 15.

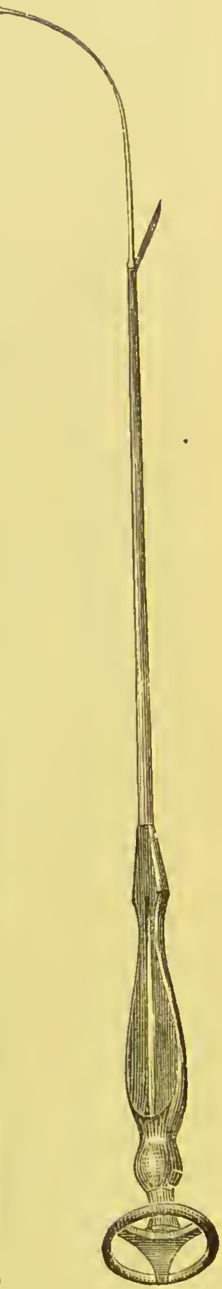

Fig. 16.

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* *Lancet*, Oct. 23, 1875.

strictured spot in two places instead of one. To maintain the interval made by the urethrotome until cicatrisation is accomplished, oval-shaped bougies are employed in the subsequent treatment (Fig. 19). Sections of these instruments are here shown:—

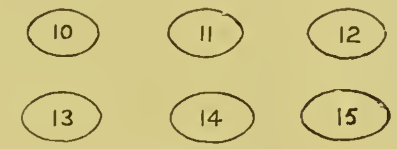
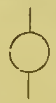
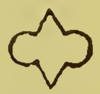


Fig. 19.

In the largest sizes the circumference of the bougies gradually diminishes towards the handle, so that the meatus of the urethra is not kept continuously on the stretch whilst they are being introduced.



The incisions thus made are as represented in this sketch. My object is to keep these patent, so that, when healing is completed, the section of the urethra, if put on the stretch, would be thus.*



Whatever instrument is chosen for the performance of internal urethrotomy, there are certain details connected with its use which should be attended to. These I will now describe, taking for my illustration a case of narrow contractile stricture in the deep urethra, for

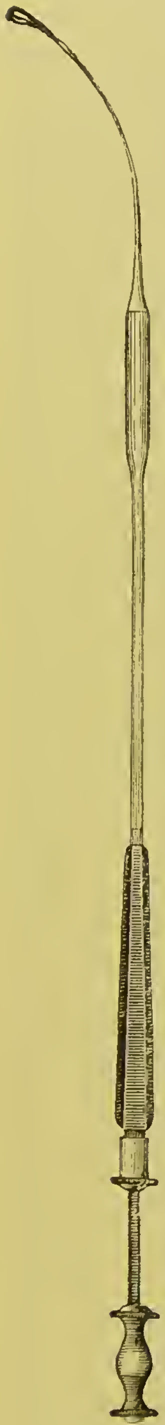


Fig. 17.

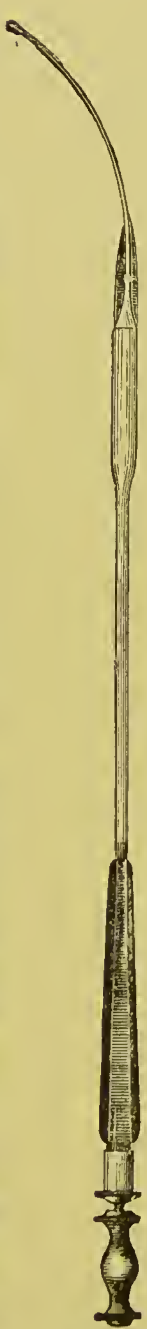


Fig. 18.

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* Putting in what Dr. Gouley describes as two "cicatricial splices."

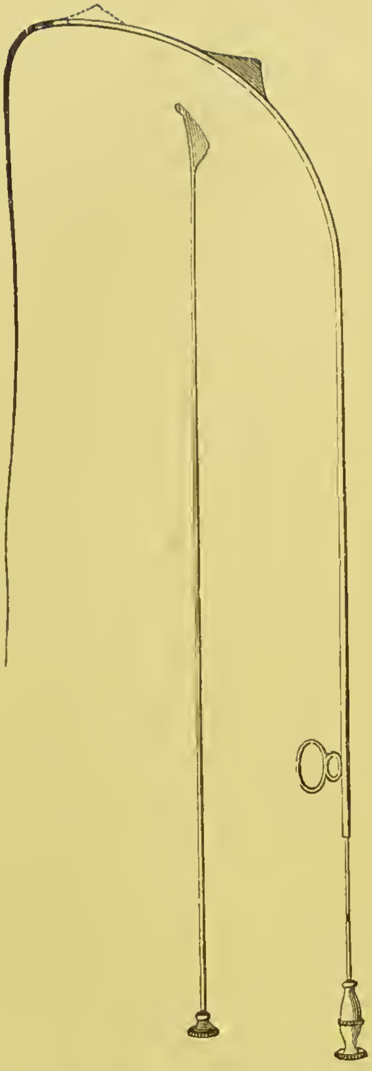

Fig. 20.

which Maisonneuve's urethrotome (Fig. 20) is selected.

The operator having first accustomed himself, as well as the patient, to the introduction of the fine filiform guide connected with the instrument, the urine is sterilised for forty-eight hours before the operation by the patient taking, every four hours or so, from five to ten grains of boric acid in water, with some syrup of tolu; quinine, salol, or hyposulphite of soda may also be used for this purpose. This is an important preliminary, for which we are indebted to Dr. Palmer, of Louisville, U. S. A. Since adopting this plan in urethral operations, I have found that the subsequent liability to rigors or elevation in temperature is lessened. An anæsthetic having been given, and the urethra injected with carbolised oil (1–20), the guide is passed with the urethrotome director following it. If the stricture is at all dense, the largest section-blade of the three which are usually supplied with the instrument will be required. This is then gently but firmly pushed along the groove until the stricture is felt to be divided. A single clean incision through the obstruction is all that is required. The two portions of the urethrotome used—namely, the blade and the director—being removed, a Gross's dilator (Fig. 21) is passed into the bladder. By means of this the incision in the urethra is divulsed as the instrument is slowly withdrawn, until the index at the handle marks that the natural dimensions of the canal have been fully reached. In this way the nick made in any stricture-bands which have escaped free division is completely opened up. Then a full-sized silver catheter (No. 12, E.) should pass with ease; if it will not, the divulsor may be reintroduced and the incision further stretched. Before the silver catheter is finally withdrawn, the bladder is to be well washed out, first with warm boracic lotion — this should be done until the fluid returns apparently clean — then, to finish with, a solution of perchloride of mercury is substituted. The strength of this is not to exceed 1 in 6,000; two or three washings with this will now suffice. About an ounce of this solution should be left behind in the bladder to be discharged with the urine that is first spontaneously passed after the operation. The patient is then removed to a warm bed, and as soon as he is conscious a draught is given him consisting of five grains of quinine, an ounce of brandy, and fifteen drops of laudanum in hot water. He is kept in bed, usually for about a

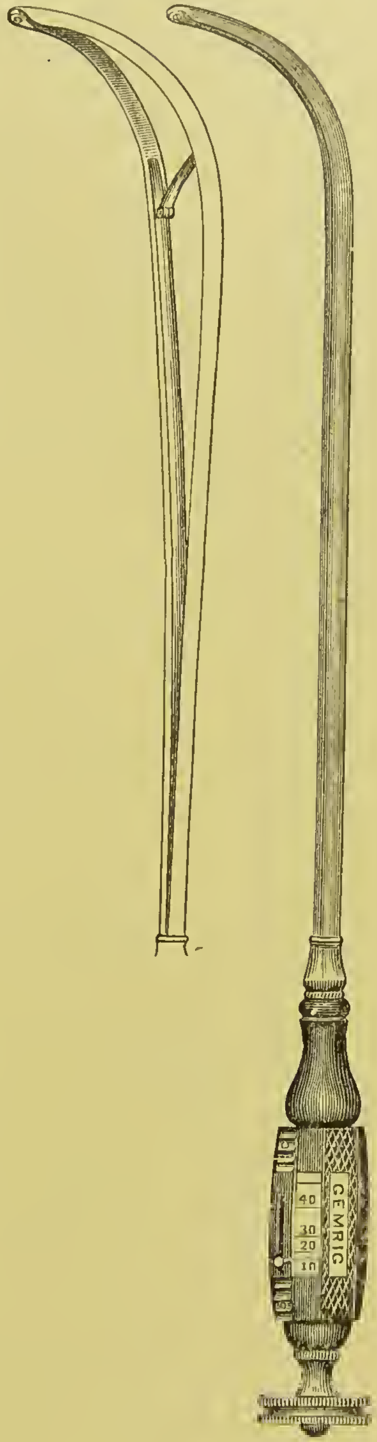

Fig. 21.

week, until an instrument has been passed once or twice, and the urine is both clean and acid. Light diet and the sterilising medicine are given. As a rule the bladder is not again washed out, and the patient is allowed to take any bland drink he may desire. A bougie is not passed till the fourth or fifth day, and then it is usually a No. 9 or 10 (E.) bulbous gum-elastic. After this a No. 12 metal bulbous bougie (Lister's shape) is generally passed every second or third day until the patient is rendered independent by being able to use his own instrument. This he is enjoined to do at regular intervals. It is rare, when attention is given to these details, to have rigors or elevations in temperature after this operation, and patients frequently say that they experience less inconvenience after it as compared with the passing of a bougie when no such precautions are taken. When patients are careful in following instructions afterwards, and in using their bougie, relapses are rare. Such is an outline of the method which I have employed for some years, and which is based on as close an adhesion to the principles of antiseptics as circumstances will permit of.

There is a form of stricture usually met with in the penile urethra, immediately in front of the scrotum, which is attended with more or less spasm of the deep urethra, so as to give the impression that the latter is strictured. This kind of obstruction often admits the passage of a No. 8 or even a No. 9 (E.), but when anything beyond this is attempted, violent spasm at once occurs. Yet under these circumstances persons often complain of difficult and painful micturition, though, for the reason stated, they are unwilling to submit to further dilatation. These cases are best treated by means of a urethrotome, which, in the first place, puts the fibres of the contraction on the stretch, often rendering them when in this condition apparent to the touch in the penile urethra, and in the second place provides for their division. Unless this kind of stricture is first stretched it is impossible effectually to divide it, and failing this no permanent benefit ensues, as complete dilatation is, as I have explained, impossible. For this purpose I usually employ Otis's dilating urethrotome (Fig. 22), which also is provided with an index at the handle for measuring the dimensions of the canal. The instrument is used in conjunction with the antiseptic directions I have just referred to. In these combinations of incision with divulsion hæmorrhage is inconsiderable, and seldom amounts to more than sufficient to stain the urine for a few days after the operation.

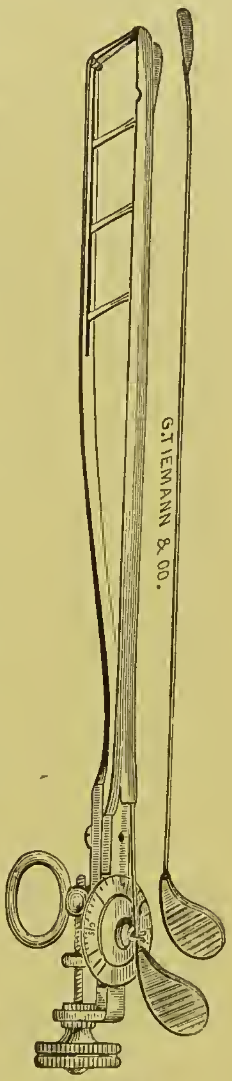

Fig. 22.

Dr. Otis,* in cases of bleeding after internal urethrotomy, passes an ordinary elastic tube with an open end beyond the point where the stricture has been divided, and retains it by means of a bandage; if this fail, the urethra is irrigated with water at a temperature of 120° Fahr. He finds these measures will arrest any hæmorrhage proceeding from this cause.

The chief objection urged against internal urethrotomy, as compared with other operations for the treatment of stricture, being to a great extent now disposed of, partly by the adoption of certain measures of an antiseptic nature, and partly by associating divulsion with it, which materially limits the extent of incision, as contrasted with older proceedings, the results, both immediate and remote, so far as my observation goes, are much more satisfactory. Later on I shall have occasion to note the circumstances under which drainage of the bladder by means of a perinæal puncture may be advantageously combined with this operation.

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* *Philadelphia Medical Times*, Jan. 12, 1884.

Holt's operation for stricture is so well known that it is unnecessary to give a description of it. Owing to its safety, and the immediate character of the relief which, in suitable cases, it affords, it has been considerably practised. Exception is taken to this operation on the ground that the urethra is liable to yield at its weakest point in the strictured circumference, thereby increasing the amount of cicatricial tissue, and adding to the difficulty of treatment if a recurrence should happen. There may be some amount of truth in this, but I think on the whole the objections urged against this operation have been somewhat exaggerated. As with other procedures everything depends upon its limitation to suitable cases.

In one instance I had to supplement this operation with another. It was in the case of a man with a tight traumatic stricture of the bulb, where signs of abscess, which might have existed at the time of, became apparent forty-eight hours after, the operation. I had the patient placed in the lithotomy position, and having opened the strictured portion of the urethra by a central perinæal incision, I passed a drainage-tube into the bladder. This gave immediate relief, and the patient made a good recovery. I saw him some years afterwards, when he told me he kept quite well by passing a full-sized bougie every week. He was an intelligent man, and recognised the importance of using his instrument regularly. I have occasionally had to repeat the operation of divulsion; one patient returns about every two years, as he prefers to submit to the process occasionally, rather than undergo the trouble of using a bougie himself. These are, however, exceptional cases, which may be mentioned in connection with a somewhat large experience of this operation.

Some years ago I published remarks * on a modification

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* *British Medical Journal*, Dec. 10, 1881.

of Holt's practice, under the title of "Stricture Stretching." I was first led to adopt this practice in cases of tight stricture with acute retention of urine, where only a small catheter could with difficulty be passed. The question often arises as to what is best to be done under such circumstances, where the retention is pressing and will not admit of any delay. If the instrument by which the necessary relief is afforded is tied in, it may easily become blocked, or be accidentally removed by the patient. Then, after the lapse of a little time, when the tension of retained urine returns, the practitioner finds himself faced with the original difficulty, probably aggravated by a further delay. I have always felt that this temporising course was open to objection, and that narrow organic strictures such as these should be dealt with, when retention is complete, in a less hazardous and more effectual manner. For this object I had constructed some years ago a modification of Holt's excellent instrument, which would enter the bladder when a No. 3 (E.) could be made to pass (Fig. 23). It is provided with a pilot, as well as a screw top, in case the former is found either useless or unnecessary; it contains a fine test-catheter on which the dilating rods run; it is fitted with a series of seven dilators, and

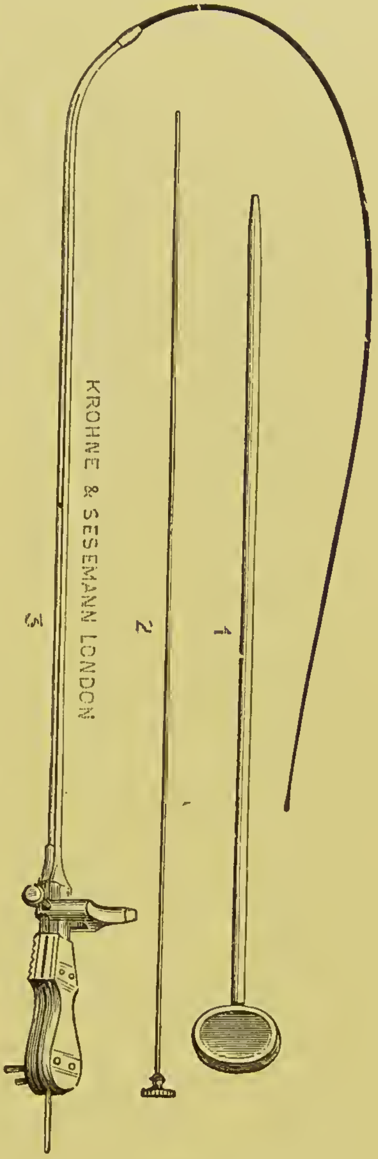

Fig. 23.

a special spring to regulate their steady introduction; and the rods are so arranged, that the calibre of the instrument can be carried from a No. 3 to over a No. 12 (E.). It is used in the following way: Either it is at once introduced before the retention is otherwise relieved, or the way is prepared for it by the preliminary introduction of No. ½, 1 or 2 (E.) metal bougies before the dilator is tried. It is hardly necessary to observe that catheterism, where undertaken under such circumstances, most certainly requires the use of an anæsthetic. On the dilator being passed as an equivalent of a No. 3 catheter, the stylet is withdrawn, and the position of the instrument tested both as to transmitting urine as well as to relation as ascertained by the finger in the rectum. These are precautions which it is well to take, when possible, under all circumstances connected with the management of difficult catheterism. Then the dilatation of the stricture by the introduction of the successive rods, in accordance with their number, should be proceeded with, whilst the anæsthetic is continued. This is to be done deliberately, so as to stretch and not to tear; the process usually lasting, according to the rigidity of the stricture, from ten to thirty minutes. When the highest rod is reached, the distended instrument is quietly withdrawn, and a full-sized silver catheter substituted. Then the evacuation of the contents of the bladder and the douching of the latter follow, this being conducted on the same lines as already described in connection with the operation of internal urethrotomy, and also in reference to the use of the bougie afterwards. In some cases I have thus been able to relieve retention, and at the same time to permanently improve the condition of many persons with whom I am still acquainted. If, in all cases of retention occurring with tight stricture, this or a similar instrument were used, both patient and practitioner would be none the less happy for the knowledge that, whatever spasm might temporarily do, there was, at all events, a way to the bladder which was capable of admitting a No. 12 catheter.

Here is an illustration from notes supplied by a former house-surgeon, Dr. Hugh Rayner :—

Case.—A. M., a mechanic, aged 47, was admitted on Dec. 20, 1881. He had suffered from stricture for eighteen years, and could only micturate in drops. In addition, he had two urinary fistulæ through which urine escaped. Only fine metal bougies could be passed, and no progress was made. The patient was placed under ether, and the stretcher introduced after a preliminary passage of fine bougies. The process of stretching occupied twenty minutes, and was almost bloodless. As the case was complicated with fistulæ, a No. 10 soft catheter was left to act as a drainage-tube, continuous drainage being practised after the manner suggested by Professor Chiene,* for nearly three weeks, when the catheter was withdrawn. The fistulæ were found soundly healed. The patient shortly afterwards left the Infirmary, micturating normally, without any leakage at the fistulous points, and able to pass a full-sized bougie for himself, the use of which he promised to continue.

In some cases where I have first performed an internal urethrotomy, this form of divulser, instead of Gross's as described in an earlier portion of this lecture, has been used with very good results. These, however, have not as a rule been instances of urgent retention.

* *Edin. Med. Journ.*, Dec., 1880.

EIGHTH LECTURE.

Perinæal Section for Stricture — Perinæal Puncture for Bladder Drainage—Drainage Tubes and their uses—Internal Urethrotomy combined with Perinæal Puncture.

Still confining ourselves to cases of stricture in which, though there may be much obstruction, the passage of an instrument along the urethra into the bladder is quite possible, we have now to consider and illustrate the circumstances under which perinæal section may be called for. Experience accumulated since Syme advocated this proceeding shows that the necessity for it may arise, first, from a local condition of the part, rendering a stricture beyond repair by any other known method; secondly, from a state of the organs above in which the bladder, prostate, ureters or kidneys may in some way be involved; and, thirdly, for the purposes of exploration and what may arise out of this. Under the term perinæal section is included the open method of dealing with the deep urethra by incision, as described by Syme, and the perinæal puncture, or *boutonnière* operation of French surgeons, to each of which attention will be given.

Cases of stricture where the whole perinæum is converted into an indurated mass of unhealthy tissue, soddened by inflammatory and urinous discharges, though not so common now as they used to be, will still be met with. These varieties of obstruction resist all methods of local treatment directed from within the urethra, it is almost impossible to dilate them, and they are quite beyond the reach of any form of internal division that has yet been suggested, or would be at all feasible. The whole brawny mass constituting the perinæum, with probably two or three urinary fistulæ in which the urethra is involved, must be divided for the purpose of giving free and unrestrained vent to the urine and to allow of the disorganised tissues returning to something like a normal condition.

The patient having been placed under an anæsthetic, and in the lithotomy position, a staff as large as the dimensions of the stricture will permit of is passed into the bladder. The groove on the staff, whatever size it may be, should be central and not lateral. Upon this as a guide the perinæum is opened by incising along the median line or raphé from any point behind the scrotum to within an inch in front of the anal orifice, and this should be proceeded with steadily until the urethra is laid open to the desired extent. This is the principle upon which the cutting portion of the operation is conducted. In consequence of the indurated nature of the tissues it is not always quite so easy to execute this proceeding as to describe it. By keeping in the median line there is but little fear of much hæmorrhage. When the staff is bared, the way to the bladder for the finger is best cleared by running one of Wheelhouse's small probe-pointed gorgets (Fig. 28) along the groove in the staff, after which digital exploration can be readily practised. When this is accomplished, a drainage-tube should be introduced; it is upon the subsequent use of this that the success of the operation largely depends. I shall presently describe in detail some of the various kinds of tubes employed for bladder-drainage and their management.

The section thus made usually remains open for some two or three weeks, and then is allowed to granulate up, the size of the urethra being maintained whilst this process of healing is going on by the regular introduction of bougies.

There are two points I would mention before I proceed to notice the second variety in perinæal openings. These are, first, to shave the perinæum and remove all the hairs from the part, which often seem to grow under this state of disease in great strength and profusion. If this is not done before the operation is commenced, they afterwards prove a source of annoyance as retainers of dirt and discharge. In the second place, when the urethra is opened, care must be taken that the whole of the stricture is divided and not a portion of it only. If you are using a small staff, test what you have done by substituting, before finishing, a larger size which may bring stricture fibres under touch which previously were unrecognised.

This operation has not unfrequently proved, as far as I have been able to judge of it, a complete cure for stricture. When I say this it is meant that the patients I referred to had no recontraction following, and that they dispensed with the use of the bougie, either for the remainder of their lives, or up to the time I was cognisant of them. Opportunities for testing this point during life and after death are not common. I can adduce one instance where the examination after death corroborated what I have said. The following is an outline of this case:—

The patient was a man aged 46, who died of chronic disease of the kidneys, in Dr. Davidson's ward in the Royal Infirmary, Liverpool, in February, 1885. When ten years old he injured his perinæum, and subsequently suffered from stricture and urinary fistulæ of the worst type. In 1867, Mr. Bickersteth performed Syme's perinæal section for him. In 1869, he was known to be quite well, and, during his recent visit to the Royal Infirmary, Mr. Bickersteth took care to determine that the stricture had not returned, though no precautions appear to have been taken by the patient during this long interval of timo. After his death from renal causes the urethra was removed and carefully examined. No sign of stricture could be found; in fact, the calibre of the urethra, along tho line where the section had evidently been made, was positively larger in proportion to the rest of the canal; it seemed to have yielded somewhat under the pressure of the urine.

Perinæal puncture of the membranous urethra is an operation of far less magnitude than the one that has just been described, and may be undertaken with as little risk connected with it as attaches to almost any of the minor operations in surgery. It is employed for a variety of purposes, including urine drainage, the digital exploration of the bladder, and for certain conditions arising out of the latter which will be noticed as we proceed. As I shall describe it, it will be found to resemble the *boutonnière* of French surgeons in many respects, as well as Cock's operation for tapping the bladder from the perinæum at the apex of the prostate. Its uses, as well as its relation with the mechanism of urine drainage, chiefly distinguish it.

The patient being placed in the lithotomy position, when under an anæsthetic, a centrally grooved staff is passed into the bladder. The correctness of the position of the instrument being verified by the finger in the rectum, the perinæum is punctured by a long finger knife entering in the median line one inch in front of the anus. The cutting side of the blade is directed towards the operator, whilst the point is made to penetrate the perinæum so as to enter the groove in the staff immediately in front of the apex of the prostate. The incision thus made is somewhat enlarged in a direction towards the scrotum, so as to admit with ease the index finger of the other hand. The latter is then introduced into the wound, and the staff felt for. If this has not been sufficiently bared as to be readily distinguishable to the touch, I clear the way by the use of a blunt knife made for this purpose; then a Wheelhouse's gorget (Fig. 28) is run along the groove in the staff so as to prepare the way for the finger which subsequently follows. The staff being withdrawn, a passage is now made into the bladder for the introduction of the drainage-tube. Thus a tube exactly fitting the wound can be inserted without incurring risk of bleeding.

The practice of this operation in its simplest form may be illustrated by the narrative of one of those chronic cases of suppuration proceeding from the deep urethra which, by their obstinacy in regard to all methods of treatment, have driven both patient and practitioner almost to the verge of despair.

A gentleman, aged 34, consulted me early in 1884 for an intermitting urethral discharge of a purulent character, at times excessive, and resulting from a gonorrhœa contracted four years previously. This discharge, which was distinctly purulent, had resisted all kinds of internal and external treatment. He had tried astringents of all sorts; an injection consisting of a grain to the ounce of each of the four sulphates—viz., iron, copper, zinc, and alum—seemed to control it best, but without curing it; a deep urethral injection of a strong solution of nitrate of silver was used, but without benefit; whilst, as a last resource, internal urethrotomy had been performed by another surgeon for the purpose of removing a slight contraction, but without any better results.

All that I could detect abnormal was a slight contraction behind the bulb, where the internal urethrotomy had been performed some weeks previously. To repeat this operation, even upon the lines laid down by Otis, offered no guarantee that a better result would be obtained. It appeared that the urethra was of the nature of a suppurating sinus, through which urine flowed out and injections flowed in, and which would not heal. The patient had been rendered most miserable for four years by the constancy of the discharge; he had run some risk to get rid of it; he had the prospect of a stricture forming, and after what had been done but little hope of getting rid of his ailment. Under these circumstances I did not hesitate to place the canal at rest for some time, and to ensure that the parts involved in the suppuration were both efficiently drained and irrigated. This process was carried out in the manner I have just described, and continued for twenty-five days, during which time the whole of the urine passed through the drainage apparatus. In ten days after the tube was removed the perinæal wound soundly healed, and no more urethral discharge was subsequently observed. Though some years have now elapsed, no tendency to stricture has shown itself.

In another instance a similar proceeding was adopted for a chronic hæmaturia, which had its origin within the prostate. No tumour or other cause for the hæmorrhage could be discovered, but the bleeding ceased after a month's perinæal drainage, and never recurred, the patient entirely regaining his health. I presume the bleeding spot healed under the influence of rest and the temporary withdrawal of all action on the part of the muscles engaged in micturition.

I will now notice some different kinds of drainage-tubes and the manner of their employment. Amongst the various means that are used in connection with the operative treatment of diseases of the urinary organs, the drainage-tube, in relation to the urine, probably occupies the most prominent position. It is, in fact, now identified with almost every procedure of importance. We see its use in connection with injuries of the urinary apparatus, more particularly in cases of rupture of the urethra, where the condition of the scar that follows is largely influenced by the kind of provision made for the disposal of the urine whilst repair is proceeding; in the treatment of several plastic operations on the urethra as well as the bladder; in the cure of chronic suppurative affections of the several parts constituting the urinary apparatus; in pouching and sacculation of the bladder both with and without stone; and particularly in the prevention of some distinctive forms of fever originating in this system. In these, as well as in other directions, its use is now well recognised.

For introduction into the bladder through the perinæal puncture, and retention in this position for the first forty-eight hours or so, I usually select a gum-elastic tube with a metal mount, having an opening on either side for the retaining tapes (Fig. 24).* In calibre they are about as thick as my index finger, that is to say, they fit with some accuracy the opening they are intended for, though I generally have some of different sizes by me in case the wound may for any reason be somewhat larger than usual. Sometimes I put a suture into the perinæal opening either above or below the tube, so as to make it fit accurately and prevent bleeding or oozing by the side. I use them in the same way after median cystotomy. They are not necessary after the lateral operation, except sometimes, temporarily, to restrain hæmorrhage by fitting the wound, as this incision into the bladder entails a condition of urinary incontinence for some days. These tubes should not be passed too far into the bladder, hence I have at hand various lengths to suit different depths in perinæums. If the fit is accurate there should be no trouble with bleeding, or necessity for a ligature. I prefer a gum-elastic tube for the first forty-eight hours, as in case there should be any oozing you have something solid to plug upon. At the expiration of this period, I usually substitute a soft rubber one, with a velvet or depressed eye, and open at the end, such as are made for me by Messrs. Tiemann, of New York (Fig. 25), in different lengths and calibres. The

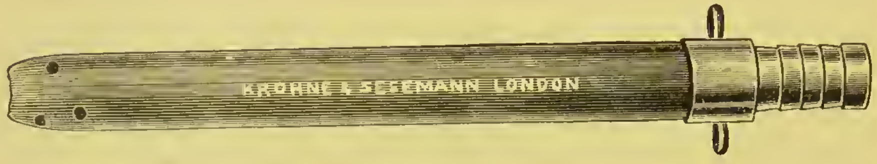

Fig. 24.

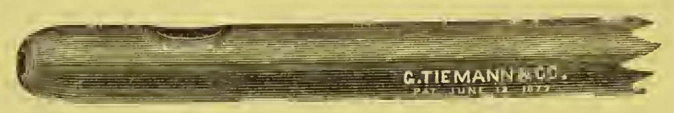

Fig. 25.

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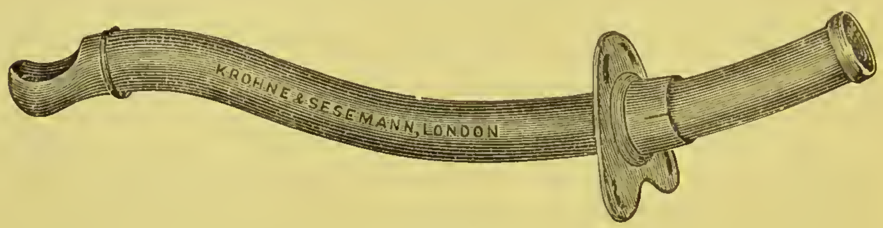
* These were first made for me by Mr. Wood, 81 Church Street, Liverpool, and more recently by Messrs. Krohne & Sesemann, London.

rubber drainage-tubes, with the punched-out eyes, are most objectionable. The mucous membrane of the bladder is liable to be sucked into them, and then, when they are withdrawn, pain, and perhaps a little bleeding, is occasioned by the sharp edge of the opening. This also applies to the rubber catheters, as I have previously remarked. The soft tubes are easily retained in position by a perinæal band, to which they can be attached either by a safety-pin or tape. In some cases of extremely pouched or sacculated bladders, where the urine drained with some difficulty, I have used the two varieties in combination with advantage, that is to say, a soft rubber tube has been passed through a gum-elastic one, on the principle of the double tracheotomy tube. Where it has also been found necessary to wash out pockets in the bladder this has proved more effectual than the single tube. After the first forty-eight hours, whatever tube is used for drainage, the bladder should be washed out through it, and then the tube be removed and changed. Care should always be taken, on replacing the tube finally, to test it with a syringe, and to see that it works accurately. For douching the bladder in connection with drainage-tubes nothing is better than a hydrostatic tank and a vulcanite tap at the end of the tubing, by which means the supply and force of whatever lotion is used can be regulated without producing any jar or sudden concussion. For the first forty-eight hours I usually let the urine drain into a pad of wood-wool or some antiseptic absorbent material which can be frequently changed. After this, when the flow is established, the patient may be kept dry by attaching a piece of rubber tubing to the metal nozzle of the drainage-tube, by which the urine is conveyed into some suitable receptacle between the patient's legs, or even outside the bed. No drainage can be perfect when the bed is of such a shape as to cause the patient to lie in a hole; the buttocks should be slightly elevated, and drainage favoured by raising the head of the bed. The latter can easily be done by a brick, or a wooden block. A little experience soon shows how all these details may be attended to, as much importance is attached to them. The length of time drainage should be carried on depends on the nature of the case. Where the urine, to commence with, is alkaline and ammoniacal or offensive, it will at all events be required until the excretion is discharged in a normal condition. I have tried other kinds of drainage-tubes, including those made of glass and of metal, but I find nothing so efficient as those I have mentioned.

There is a vulcanite tube with a movable collar described by Dr. F. S. Watson, of Boston, U.S.A., which will be found useful in some cases where the bladder is much pouched behind a large prostate.* The end of the instrument lies in this dip, and thus perfect drainage as well as provision for irrigation of this portion of the bladder are secured. By the movable collar the instrument can be at once adapted to any depth of perinæum required (Fig. 26).



Fig, 26.

I have now referred to my own experience in connection with internal urethrotomy, perinæal section, and perinæal puncture of the bladder by way of the membranous urethra, in relation more particularly to stricture as well as to other diseased conditions of the urinary apparatus. It will therefore be convenient in this lecture to consider a combination of two of these methods, namely, those of internal urethrotomy and perinæal puncture of the bladder, which I advocated, under certain circumstances,* some years ago, and have since continued to practice. I have already referred, in connection with the subject of toxic urine, to the remarkable immunity from the specific form of what is called urinary fever that has been observed in those instances where, in operations on the urethra, such for instance as internal urethrotomy, means for perfect urine drainage are at the same time provided. Under such a condition, rigors and elevation of temperature no longer occur. Nor are the results following wounds of the urethra, where care is taken to supply adequate urine drainage, much less remarkable, as I shall hope presently to show when I come to treat of injuries to the urethra. In one case, where repair goes on under the constant presence of confined urine in the wound, it means eventually a dense and contractile stricture of the worst form; whilst, on the other hand, where the conditions of contact between the wound and the urine are reversed, the resulting scar is innocuous.

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* The operative treatment of the enlarged prostate.

For reasons such as these it seemed to me that immediate and permanent benefit would follow the combination of these two methods employed in the treatment of certain forms of stricture. Nor have I been disappointed, as time has shown, in the anticipations I formed. This proceeding is particularly well adapted to recurring cases of stricture, both in the penile and deep urethra after a previous internal urethrotomy; to some instances of urinary fistulæ complicating stricture; to cases of stricture too extensive for internal section, but for which the older operation of perinæal section more than suffices; and for stricture complicated by states of urine which render drainage a safe precaution where an incision, however slight, is made directly communicating with the septic excretion. Further, in some cases of stricture associated with spasm, it has been effectual in giving permanent relief. Nor do I stand alone in the advocacy of this proceeding. Referring to it, Dr. S. Alexander, of Bellevue Hospital, New York, observes *—

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* *British Medical Journal*, July 18, 1885.

> "This case is a striking example of the danger of septic infection after catheterism, internal urethrotomy, and the like, in cases of stricture of the deep urethra, with ammoniacal or fœtid urine. Owing to this danger, I have almost given up treatment by dilatation in such cases, and prefer to perform at once the external perinæal operation, with vesical drainage in the manner suggested by Mr. Harrison. In this way the stricture can be at once disposed of, and the bladder thoroughly disinfected and drained. The use of the perinæal tube prevents contact of the urine with the urethra. Up to the present time I have treated in this way more than thirty cases of stricture in which the urine was ammoniacal or fœtid. In all of these there was partial or complete retention of urine."

Dr. F. N. Otis also writes:

> "I have advocated the combined method of operating for many years of all strictures which present in the anterior urethra complicated with close stricture at or deeper than five and a half inches, and my experience gives me a growing confidence in its value."

The details of the operation are such as I have already given when dealing with internal urethrotomy and perinæal puncture of the bladder by the membranous urethra. Briefly to recapitulate for the purpose of noting an additional point or so: The patient having been anæsthetised, an internal urethrotomy is performed. He is then placed in the lithotomy position, when a perinæal puncture is made on a full-sized median grooved staff, and a drainage-tube is passed into the bladder. As the anterior portion of the urethra will be unused so long as the drainage continues, I usually introduce a piece of thin drainage-tube by the meatus, and bring it out through the wound by the side of the perinæal tube, and then make a loop of it. In this way this portion of the urethra can be washed out, and the internal urethrotomy wound kept clean and sweet; unless this precaution is taken, a blood-clot may be retained in the anterior

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* *Journal Gen.-Urin. Diseases*, New York, Feb., 1891.

urethra, and, by decomposition, cause a rise in temperature. It is therefore not surprising that the cicatricial splice thus introduced into the canal materially differs from one that would be formed under opposite conditions. The anterior drainage-tube may generally be removed in the course of a day or so, as the use of a syringe introduced within the meatus will then be found a sufficient means for irrigation, the fluid escaping by the perinæal wound. On the withdrawal of the perinæal tube some days afterwards, the treatment resolves itself into the occasional use of a bougie, as previously referred to. I have selected the following cases in illustration of some of the details of this operation:—

Case I.—J. C., aged 45, was admitted on July 2nd, 1884, with a tight stricture of the bulbous urethra, perinæal fistulæ, and a chronic orchitis. On July 9th, I succeeded in passing through the stricture a No. 2 English bougie. In the evening he had a severe rigor, and was feverish afterwards. On July 11th, I divided a long stricture with Maisonneuve's urethrotome. I then placed the patient in the lithotomy position, passed a grooved staff, opened the membranous urethra, and inserted a drainage-tube in the bladder. No rigor or fever followed this, and the urine drained clear of the stricture. Twice a day the urethra was washed out from the external meatus with an antiseptic fluid, and for nineteen days the urine was discharged by the perinæal tube. After the drainage-tube was withdrawn, the wound closed, and the patient left the Infirmary on August 15th, passing a full stream, and with a urethra admitting a large-sized instrument.

Case II.—W. C., aged 39, was admitted on January 2nd, 1885, with the history of a stricture extending over twelve years. He had undergone, some years previously, Holt's operation at a Birmingham hospital. He had a long tight stricture at the bulb, and another behind it, with a suppurating orchitis, which required opening. I could only pass a fine instrument to commence with, and it was not till February 6th that sufficient progress had been made to get in a urethrotome, with which I divided both strictures. To be sure that all constriction had been removed, I introduced Gross's dilator, and, having separated the blades, after the instrument had entered the bladder, withdrew it. Having thus satisfied myself that the stricture had been removed, I passed a grooved staff, and opened the membranous urethra for the passage of a drainage-tube into the bladder. The progress of this case was delayed by some blood-clots which were retained in the anterior part of the canal and suppurated, rendering an opening necessary to give exit to the discharge. The latter contingency has since been provided against, by introducing a piece of drainage-tube through the external meatus, and bringing it out by the side of the bladder-drainage tube as described; this permits any blood to drain off, and affords a ready means for washing out this portion of the canal with an antiseptic fluid.

In addition to this drawback, the patient had a rather sharp attack of bronchitis, to which he appeared subject. The perinæal drainage-tube was finally withdrawn on March 19th, by which time the cicatricial splice was soundly completed, and a full-sized instrument could be passed into the bladder. On April 23rd the patient was discharged well. In May, 1885, and again during 1889, he was seen. Both wounds were healed; he was passing urine in a full stream, and a large bougie passed without any stricture being felt. What pleased me most was to find the steady improvement that had taken place in the tissues of the urethra; instead of being harsh and unyielding, they had become almost as soft and pliant as in the original state. This was obvious both from within and without.

NINTH LECTURE.

IMPASSABLE STRICTURES — ALTERNATIVE MEASURES — WHEELHOUSE'S AND MASTIN'S OPERATION.

ATTENTION has hitherto been mainly directed towards the treatment of strictures which, though presenting some varieties, have had a common feature, that is, all admitted the passage of an instrument through them into the bladder. Such a possibility represents a most important point in their management.

I will now proceed to notice forms of urethral obstruction where this is not the case, and which are generally referred to as "impassable strictures." Under this category we shall find two varieties: (1) Instances where the canal is absolutely closed by reason of structural obliteration involving some portion of it. These are, of course, associated with a urinary fistula or false route through which the excretion entirely escapes after it has entered the bladder. They will be considered in connection with the latter complication. (2) Cases where, though the canal is closed, or apparently so, against the passage of an instrument, are, or have recently been, permeable in some degree to urine, as in the act of normal micturition. It is just as well that such a distinction should be at once recognised, in order that the practitioner may form some estimate as to the possibility of catheterism.

Though never justifying the use of force, I maintain that in cases of retention due to an organic stricture the fact should never be lost sight of that it is some temporary cause, distinct from the actual contraction in the canal, that converts impeded micturition into a complete stoppage. A plug of mucous, or the concurrence of spasm or congestion, added to the distension of a fully-loaded bladder, are quite capable of bringing this about in a strictured urethra. Hence the practitioner, though his efforts to give relief with the catheter may prove abortive, should not necessarily conclude that the canal is permanently impassable and immediately requires treatment as such. Temporary measures, as, for instance, aspiration of the bladder above the pubes, often show this is not so, and the few hours' respite thus given is frequently in itself sufficient to entirely alter the aspect of the case. This is a strong argument in favour of a safe, though possibly temporising course, as against the risk of doing what may prove to be irreparable damage, by a too prolonged or assiduous use of the catheter.

On the other hand, cases will be met with, not now so frequently as they used to be, where a stricture proves in competent hands not only persistently impassable to an instrument, but progressively damaging to the parts and organs in relation with it. Where such reasons exist, independently of the question of retention of urine, and after a fair and sufficient trial has been made to bring the case within the pale of the passable variety, it will be necessary to consider the adoption of other means. Under these circumstances, it may be generally stated that three courses are open, having for their object not merely the temporary relief of retention, should this happen to be present, but the restoration of the urethra so as to render it again passable to those instruments which will be required for the immediate as well as future protection of the individual. These methods may briefly be summed up as:

(1) Perinæal section without a guide or staff. This is an operation of considerable difficulty, often taxing to the uttermost the patience and perseverance of the surgeon.

Under these circumstances, the most must be made of the two landmarks which such cases present; these are (*a*) the anterior extremity of the stricture, which is indicated by the point to which a staff can be passed, and (*b*) a dilated condition of the urethra found behind strictures of long standing, which, when the bladder is distended, is evident to the touch externally, or to the finger in the rectum. In cases complicated with perinæal fistulæ through which urine has for some time been passing, even the latter landmark can hardly be said to exist, as the urine escaping through the false passages fails to exercise that dilating power upon this part of the urethra which is usually observed in strictures that are not so involved.

With these for landmarks, such as they are, to effect a junction between them, and so to reach the urethra by division of the stricture, two plans of proceeding are practicable. One is by incising the perinæum along the median line down to the point at which the staff is arrested, and thence backwards towards the dilated portion of the urethra. The other consists in reversing this order of proceeding by inserting the knife towards the dilated portion of the urethra behind the stricture, and then carrying the incision forwards. I am disposed to think that the former method is to be recommended. When the operation by either plan is successfully practised, the operator should be able to pass a catheter into the bladder along the whole length of the urethra, so as to satisfy himself that the stricture has been completely divided. I usually leave a drainage-tube in the bladder, introduced through the perinæal wound, as already described. Subsequently the treatment consists in the introduction of bougies at intervals of four or five days, according to circumstances. As I have said, the operation of external urethrotomy without a guide is one of considerable difficulty, and no one can undertake it without a misgiving that, though the proximal portion of the urethra may be opened up, the stricture may escape that complete division which is essential to the ultimate success of the operation. Hence it is a proceeding that can hardly be recommended except on some emergency.

(2) Opening the bladder above the pubes and introducing a guide from behind forwards. Advantage is here again taken of the dilated condition of the urethra behind a chronic stricture. This is a method which has also been successfully practised. A reference has been made to it in my fourth lecture. I should not advise it, as where there is a tight stricture in the urethra such a course is by no means free from the risk of a supra-pubic fistula following it.

(3) Opening the perinæum *in front of* the stricture, searching for the contracted orifice of the stricture, and directly dealing with it is the proceeding recommended. For this we are indebted to Mr. Wheelhouse, who has kindly given me permission to quote his paper *in extenso*, and to make use of his illustrations.*

"Notwithstanding the length of time that has elapsed since, in 1869–70, I brought before the profession, in the columns of the *British Medical Journal*, my method of finding my way, in cases of impermeable stricture from the perinæum, *through* the stricture and into the bladder, the subject seems to have received so little notice that I deem it advisable once more, after several years of successful employment of the operation, to revert to the subject; and I am induced to do this the more willingly, because I find that, even in the most recent and most voluminous works on surgery, the subject is dismissed with very few words, and the old haphazard measure of reaching the bladder without any guide—it *may be through*, or it *may be altogether wide of, the stricture*—is still recommended and described as the one in ordinary use. Over this method, the procedure which I adopt has at least the advantage of greatly increased precision; it renders an operation, confessedly hitherto one of the most difficult in surgery, a comparatively easy one, and one which, in my hands and in those of my colleagues, has given results infinitely more favourable, both in immediate and ultimate effect upon our cases, than any we had ever seen before its introduction. The instruments required are as follows: lithotomy bandages; a special staff, fully grooved through the greater part, but not through the whole, of its extent, the last half-inch of the groove being 'stopped,' and terminating in a round button-like end (Fig. 27); an ordinary scalpel; two pairs of straight-bladed forceps, nibbed at the points; ordinary artery forceps and ligatures; sponge; a well-grooved and finely probe-pointed director; Teale's probe-gorget (Fig. 28); a straight probe-pointed bistoury; a short silver catheter (No. 10 or 11 gauge), with elastic tube attached.

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* *British Medical Journal*, June 24, 1876.

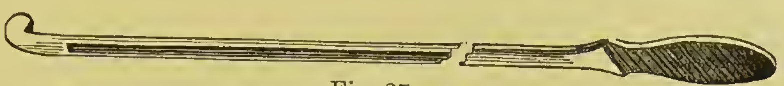

Fig. 27.

"The patient is placed in lithotomy position, with the pelvis a little elevated, so as to permit the light to fall well upon it, and into the wound to be made. The staff is to be introduced with the groove looking towards the surface, and brought gently into contact with the stricture. It should not be pressed much against the stricture, for fear of tearing the tissues of the urethra, and causing it to leave the canal, which would mar the whole after-proceedings, which depend upon the urethra being opened *a quarter of an inch in front of the stricture.* Whilst an assistant holds the staff in this position, an incision is made into the perinæum, extending from opposite the point of reflection of the superficial perinæal fascia to the outer edge of the sphincter ani. The tissues of the perinæum are to be steadily divided until the urethra is reached. This is now to be opened *in the groove* of the staff, *not upon its point,* so as certainly to secure a quarter of an inch of healthy tube immediately in front of the stricture. As soon as the urethra is opened, and the groove in the staff fully exposed, the edges of the healthy urethra are to be seized on each side by the straight-bladed nibbed forceps, and held apart. The staff is then to be gently withdrawn until the button point

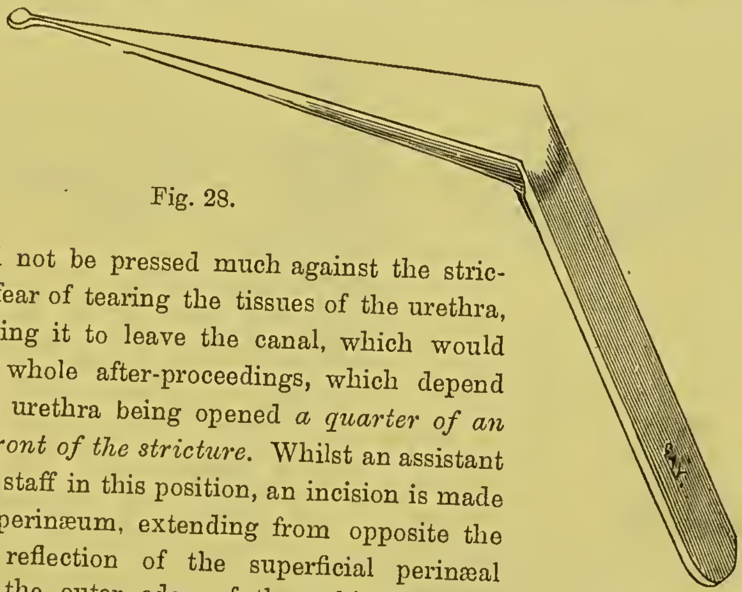

Fig. 28.

appears in the wound. It is then to be turned round, so that the groove may look to the pubes, and the button may be hooked into the upper angle of the opened urethra, which is then held stretched open at three points thus (Fig. 29), and the operator looks into it immediately in front of the stricture. Whilst thus held open, the probe-pointed director is inserted into the urethra; and the operator, if he cannot see the opening of the stricture, which is often possible, generally succeeds in very quickly finding it, and passes the point onwards *through* the stricture towards the bladder. The stricture is sometimes hidden amongst a crop of granulations or warty growths, in the midst of which the probe-point easily finds the true passage. This director having been passed on into the bladder (its entrance into which is clearly demonstrated by the freedom of its movements), its groove is turned *downwards*, the whole length of the stricture is carefully and deliberately divided on its under surface, and the passage is thus cleared. The director is still held in the same position, and the straight probe-pointed bistoury is run along the groove, to insure complete division of all bands or other obstructions. These being thoroughly cleared, the old

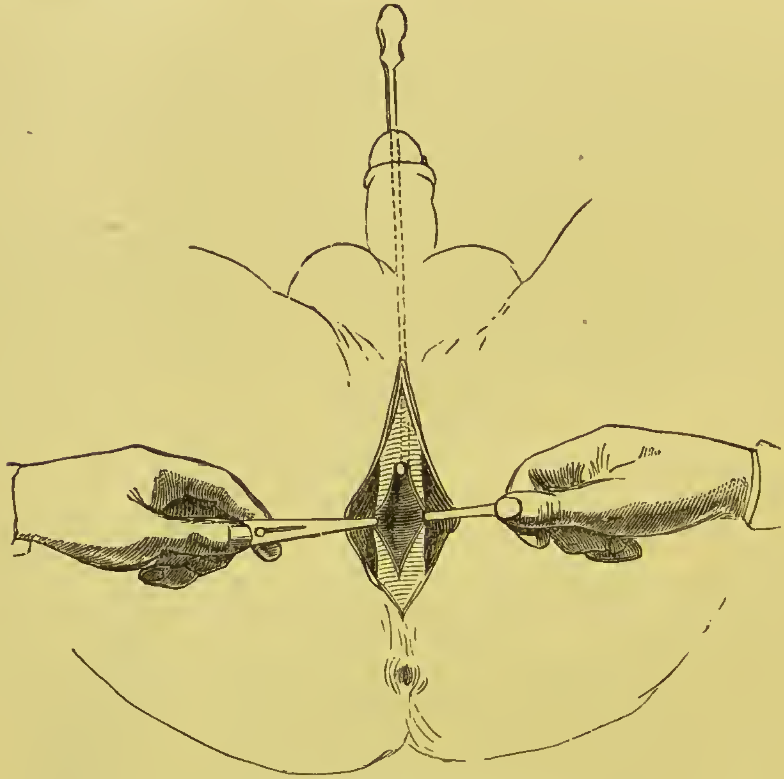

Fig. 29.—Staff introduced.

difficulty of directing the point of a catheter through the divided stricture and onwards into the bladder is to be overcome. To effect this the point of the probe-gorget is introduced into the groove in the director, and guided by it, is passed onwards into the bladder, dilating the divided stricture, and forming a metallic floor, along which the point of the catheter cannot fail to pass securely into the bladder. The entry of the gorget into the latter viscus is signalised by an immediate gush of urine along it.

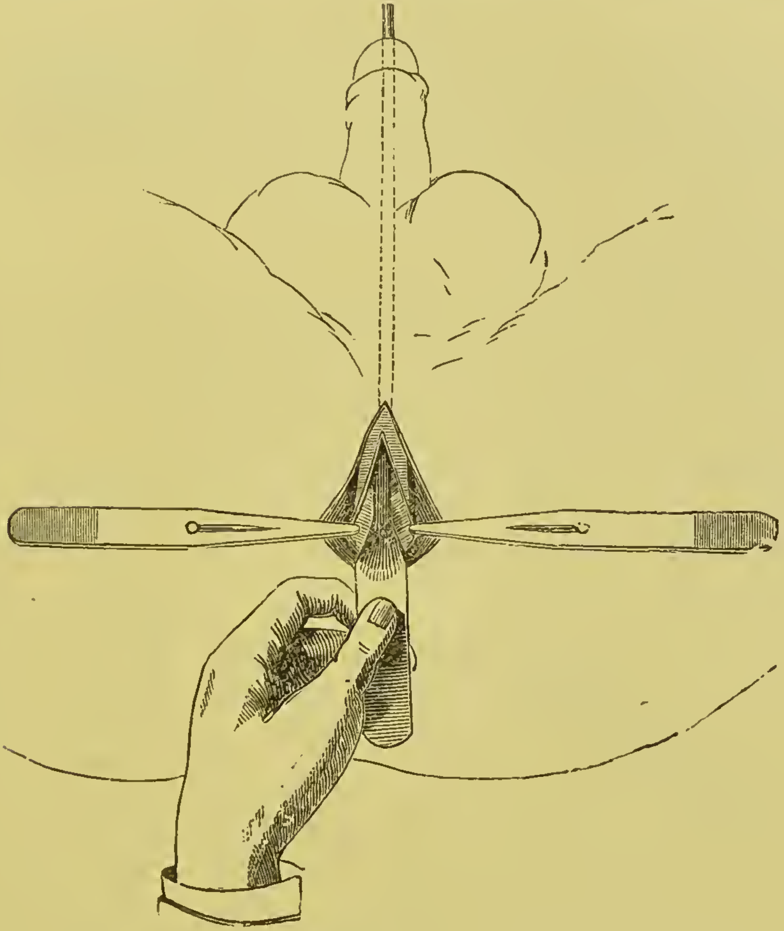

Fig. 30.

"The short catheter is now passed from the meatus down into the wound; is made to pass once or twice through the divided urethra, where it can be seen in the wound, to render certain the fact that no obstructing bands have been left undivided; and is then, guided by the probe-dilator, passed easily and certainly along the posterior part of the urethra into the bladder, as seen above (Fig. 30).

"The gorget is now withdrawn; the catheter fastened in the urethra, and allowed to remain for three or four days; the elastic tube conveying the urine away to a vessel under or by the side of the bed.

"After three or four days, the catheter is removed, and is then passed daily, or every second or third day, according to circumstances, until the wound in the perinæum is healed; and, after the parts have become consolidated, it requires, of course, to be passed still from time to time to prevent recontraction."

Dr. Claudius H. Mastin, of Mobile, U.S.A., has recorded a method of treating some strictures by what he calls their subcutaneous division. It seems to present advantages which may render it applicable to some of the more advanced forms of the disorder. I will give the description of the operation in the author's words* :—

"I now desire to describe briefly an operation which I have employed since the year 1868, whenever an occasion has demanded an external section. Thus far it has proved entirely satisfactory to me, and especially so to those upon whom I have had occasion to perform it.

"In the year 1872 I wrote a paper upon the result of my operations by this method, and since that date to the present, with an increased experience, I have seen no reasons to alter the views which were then expressed. I now claim nothing of originality for the operation, since it is based almost entirely upon the old *la boutonnière*, the incision being very small, and made anterior to the stricture; then, a very small probe-pointed director or whalebone guide is passed along through the stricture, and a delicate tenotome incises its upper wall subcutaneously; the small wound in the integuments is closed by pin sutures, and left to heal by primary union. Adhering to the maxim, 'dilate where you can, cut where you cannot,' I only resort to this operation in those cases where no catheter or guide can be made to traverse the urethra from the meatus to the bladder; cases which require some operation for the immediate evacuation of retained urine, and in which it is not possible for me to perform an internal urethrotomy.

"The patient, duly prepared by opening the bowels freely with an enema, and a hot hip bath given to tranquillise the nervous system, is placed upon a table, then secured in the ordinary position for cystotomy, and anæsthetised. I now pass down the urethra the tube of Benique

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* *Trans. American Medical Association*, May 1, 1886.

(Fig. 31), which is a plain silver tube open at both ends, about nine millimeters in diameter, and from six to eight inches in length; this tube protects the walls of the urethra, and puts on the stretch the face of the stricture. The tube is now filled with a bundle of small filiform whalebone probes, which are carefully passed down to the stricture; by trying first one and then another it is possible that one may engage the opening and pass on into the stricture. This being accomplished, I remove the disengaged probes together with a tube, and after securing the probe in the bladder, I pass over it a Wheelhouse staff which has been drilled through its end to answer the purpose of a Gouley staff, and carry it down to the stricture. It is now handed to the assistant, who holds it lightly, yet firmly, against the coarctation, whilst I open the urethra in the groove of the staff, making an incision about half an inch in length. I then draw outward the staff just sufficiently to enable me to find the whalebone probe as it passes through its end and on into the stricture: this I secure by passing a small blunt hook behind it, after which the staff is removed entirely from the urethra, and the distal end of the probe drawn out through the little wound which has been made; and now, over the probe I pass a little gorgeret (Fig. 32); this has its blade directed upward, and being run along the probe, as its guide, it passes through the opening into the urethra, and then down the stricture, which is cut on its superior face. A catheter is now passed along the entire urethra into the bladder, and the urine evacuated, after which I carefully examine the site of the stricture with graduated metallic ball probes for the purpose of detecting any bands which, perchance, may remain; if found, they are divided by the retrograde urethrotome of Civiale, and the full calibre of the urethra restored.

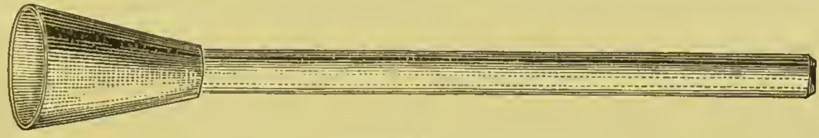

Fig. 31.

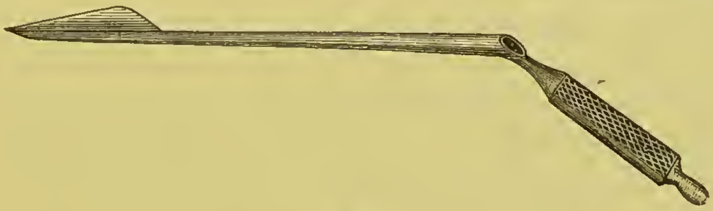

Fig. 32.

"In the event, however, that it is not found possible to pass a whalebone probe in the first instance, so as to gain command of the stricture before opening the urethra, I then pass either the staff of Wheelhouse, Gouley, or an ordinary staff of slight curve with deep groove, down to the face of the stricture, and practice the Leeds operation, with the exception that I do not open the whole stricture; but having got the whalebone probe through the coarctation, I thread over it the little gorgerct and incise it on its superior face, just as described in the instance where the probe was passed along the tube of Benique, always taking care to sever any and all bands which may remain. This opening simply serves the purpose of shortening the canal and bringing us nearer the obstruction; it furnishes us a passage of only some few lines in length in which to manipulate our instruments, in place of a canal of several inches in extent, as would be the case if the urethra had not been opened. I thus virtually perform an internal section; I do not open the whole coarctated canal and lay bare to the external wound the cavity of the urethra, but I leave it, so far as the stricture is in question, just in the same condition as an urethra upon which I had done an internal urethrotomy.

"In the absence of the little gorgeret, I have found a very narrow-bladed urethrotome of Maisonneuve, conducted by a small filiform bougie passed through the external opening and coiled within the bladder, to serve a most excellent purpose, provided the staff is grooved on its concavity, so as to insure the incision being made upon the roof of the urethra. Such, in brief, is the method I have adopted of operating *externally*, and find that it is easy of execution, and satisfactory in its results.

"Having carefully divided any existing bands, and restored the lumen of the urethra, I then pass a sound into the urethra, and, after the slight oozing of blood has ceased, I wash the parts thoroughly with cold water, to which may be added either a chlorine or weak mercury solution, for the purpose of cleansing and disinfecting the wound. Now I close the wound accurately with two or three pin sutures, passed deep enough to engage the divided edges of the urethral canal, and, after coaptating the edges of the skin, I encircle the pins with a flat thread in the form of the figure 8; then the sound is removed, and its place occupied by a full-sized catheter passed down to the prostatic urethra, but not into the bladder. The patient is put in bed, and kept on his side, with instructions to push the catheter into the bladder when he has a call to urinate, and always, so soon as the urine has been discharged, to withdraw the catheter sufficiently far to get it out of the bladder, but not beyond the stricture. This catheter is used for only twenty-four to thirty-six hours, just long enough to insure the protection of the wound from the passage of the urine until it has been in a measure glazed over, and the strictured portion softened up by the presence of the inlying catheter. On general principles I am opposed to the *sonde à demeure* or retained catheter, and for obvious reasons too patent to need mentioning here; but the sound or catheter, used as I suggest, answers all the purposes for which it is intended, and keeps the urine from the wound until it is sufficiently protected by a glaze which prevents the urine passing into the external incision. At the expiration of this time the catheter is dispensed with, and the patient left to pass his urine at will. About the fourth, or, at latest, the sixth day, I remove the pins, and do nothing more to the wound save keep up the dressing of lead-water and opium—which is applied immediately after the operation—for two or three days longer. Now the patient is permitted to get up and stir about, and within eight or ten days he resumes his former vocations. The after-attention is such as is usual in all operations for stricture, whether they be external or internal, viz., the systematic use of gradually increasing steel sounds until the maximum calibre attainable in the special urethra has been reached.

"With this course judiciously pursued, I find that I am able to discharge my patients perfectly healed within from eight to twelve days; and in not a single instance, out of some twenty-five to thirty operations, have I had to contend with any hæmorrhage or the annoying complication of urinary fistula.

"The advantages to be derived from this operation are—the short time of confinement for the patient, freedom from hæmorrhage, quick union by primary adhesion, and the small amount of resultant cicatricial tissue, which is always deposited in greater proportion the longer the healing process continues. The retained catheter for the first day or two does good rather than harm, since it protects the fresh incision from the toxic effects of the urine until it has become glazed over with lymph, and acts, at the onset, by pressure upon the divided stricture, compressing the vessels which have been divided and which might bleed after reaction; it also sustains the urethra as a splint, and prevents the stricture from reuniting until we have time to begin gradual and systematic dilatation with the steel sound. The comparative immunity from urethral fever which my patients have enjoyed after this operation, I feel certain, is due almost entirely to the use of the inlying catheter as I employ it. I do not desire it to be understood that I advocate the use of a retained catheter throughout the entire confinement of the patient to bed, but that I use it for only the first twenty-four to thirty-six hours—just sufficiently long to permit the wound to glaze over with lymph, and model, as it were, the granulations by gentle pressure."

It will be observed that this operation has something in common with Wheelhouse's method previously referred to; as well as with the practice of closing the perinæum after excision of a stricture as adopted by Guyon and others.

TENTH LECTURE.

STRICTURE COMPLICATED WITH SYPHILIS—CHANCRE OF THE MEATUS—CANCEROUS STRICTURE.

MR. T. W. NUNN has pointed out * that many cases of stricture had a syphilitic taint, and required for their treatment the employment of those means which exercise a curative power over this specific disorder.

As I have on many occasions had the opportunity of verifying the correctness of these views, and of recognising their value in the treatment of what, at first sight, appeared to be the worst forms of stricture, I think it desirable that this complication should not here pass entirely unnoticed. I do not refer to the puckerings consequent on the healing of venereal ulcers, which are usually met with at the meatus, but to the deposition, about the urethra, perinæum, or scrotum, of the syphilitic exudation, which, becoming organised, often in considerable masses, impedes the dilatation of the canal. From their extent and induration, these strictures apparently present an unfavourable aspect, but on diagnosing their nature, they eventually prove satisfactory to treat.

I will now illustrate certain forms of stricture having a syphilitic basis, to remedy which specific treatment is required. An ordinary hard chancre at the meatus may act as, and be mistaken for, a stricture.

CASE.—I was consulted by a patient for contraction at the meatus. Three months previously he had a chancroid sore on his penis, which in the average time healed by the usual remedies. Tho sore was of a

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* *Trans. Med.-Chir. Society*, 1866.

local nature, and no secondary consequences were anticipated. About the time it was healing, an induration, accompanied by a slight gleety discharge, appeared at the meatus, which slowly but steadily increased until it involved the last inch of the urethra. As the hardness increased, so did the difficulty in making water. Upon examination, I observed the soft and apparently non-syphilitic scar of the first sore in the sulcus. The orifice of the urethra was occupied by a hard mass, extending downwards for nearly an inch, and inverting the lips of the canal. I could pass a probe through it, and on squeezing the urethra some watery discharge exuded. One or two glands in the groin were indurated, but not extensively. Though in some respects this case had the appearance of an ordinary stricture at the meatus, there could be no difficulty in concluding that the obstruction was caused by a chancre. I advised the discontinuance of bougies, and that the patient should take mercury. In eight weeks the induration had almost gone, and all difficulty in passing water.

The obscurity of diagnosis was in the sequence of the two forms of venereal sore—viz., the locally contagious and the infecting. I believe this to be an instance of double inoculation occurring at the same time. The next case illustrates a connection which occasionally exists between stricture and syphilis.

Case.—In 1875, a patient consulted me for a stricture, which had been caused by an accident in hunting. From the description, it was probable that if his urethra had not been ruptured, it had been contused. At the time of the accident he was suffering from secondary syphilis. For some weeks after the injury he experienced little or no inconvenience in passing water; he continued to take horse exercise, and paid no attention to the constitutional symptoms from which he was suffering. In three months afterwards symptoms of stricture appeared, and progressed rapidly, accompanied with induration behind the scrotum. When I first saw him the signs of stricture had extended over seven months. The scar of the syphilitic sore was still visible on the penis, and remained hard, as well as two or three small glands in the groin. There was considerable induration to be felt in the perinæum, behind the scrotum, and more so than appeared explicable by the injury he had received, hence I was led to inquire closely into his history. Upon examining the patient, I found that a No. 3 bougie was grasped with considerable tightness. As I concluded that the case was one of traumatic stricture, complicated with syphilis, I placed the patient under mercury, and commenced treatment by gradual dilatation. In three months the hardness in the perinæum, the scar, and the glands disappeared, and a full-sized instrument could be readily passed. He has since continued to use a bougie, and has had no further difficulty.

The last case I shall mention was under treatment in hospital, where I took the opportunity of drawing attention to this special complication.

Case.—The patient suffered from stricture, caused by gonorrhœa. For two years the urine had passed through a fistula behind the scrotum, but little escaping by the natural channel. The perinæum, scrotum, and edges of the fistula were as hard as cartilage, a condition which I at first attributed to the irritating influence of the urine and the persistence of inflammation about the parts. I found the patient had suffered from syphilis about three years previously, and there still remained evidence of it. The throat was deeply scarred, there was an induration in the centre of the tongue, and thickening of the periostæum over one clavicle, and shin. He was a sailor, and had never received treatment for syphilis. Seeing that no difficulty was experienced in passing water, I resolved to rest content for the present with placing him under mercury, which was maintained for several weeks. By treatment he improved in a remarkable manner, and the indurations disappeared to a considerable extent. In eight weeks treatment by bougies was commenced, and before the patient left the hospital I had the satisfaction of finding the fistula close, and the urethra capable of receiving a large bougie.

In some of these cases of syphilitic stricture, where both the mucous membrane and subjacent structures are alike involved in the hardened mass, I have not been able to do much until the channel of urine has been temporarily diverted by means of a perinæal incision. In this way, rest to the diseased part being insured, it has been found that absorption took place under anti-syphilitic treatment, and the function of the canal was restored.

Where the syphilitic taint exists, excepting in the tertiary forms, the patient should be brought under the influence of mercury, which is to be maintained until all traces of the infection, constitutional or local, cease to appear. There is no other drug upon which reliance can be placed. The outcry that one occasionally hears in reference to it is a relic of bygone days, when its abuse was thought to be its use, clinical observation then falling far short of the precision which now obtains. Some important investigations have been made bearing upon the tonic influence that mercury is capable of exercising. Most of us must have observed how persons improve in condition, gain weight, and become sleek under its action. Dr. Keyes has paid attention to this subject, and demonstrated "that mercury in minute doses is tonic in all cases where it can be digested, in syphilis or out of it, continued for a short or a long (over three years) time." By the use of the hématemètre he has shown that syphilis diminishes the number of red corpuscles below the healthy standard. Mercury in small doses, continued for a short or long period in syphilis, alone or with the iodide of potassium, increases the number of the red corpuscles in the blood, and maintains a high standard of the same." *

Where syphilis occurs as a complication of stricture, I prefer commencing the mercurial treatment by a course of inunction. It is, I know, somewhat old-fashioned, but experience shows that it has many advantages, one being the readiness with which its effect on the system can be controlled. Inunction may be employed either by the ointment or the oleates, the amount of mercury in the latter varying from five to twenty per cent. Anything like an excessive action should be avoided, the object being to accomplish what is required with as little disturbance to the patient as

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* *The Tonic Treatment of Syphilis*, by E. L. Keyes, M.D. New York, 1877.

possible. Salivation is under all circumstances to be deprecated. If any further evidence of the value of inunction in the treatment of syphilis were necessary, I could refer to the extended experience of Dr. Brandis, of Aix-la-Chapelle, under whose advice it is so largely employed in connection with the natural resources of this fashionable retreat. When inunction is impracticable, either from the patient being unable to resort to it, or from the effect produced by the mercurial ointment on the part to which it is applied, I prefer the perchloride or the proto-iodide of mercury, the latter being advantageously combined in a pill, with a little Dover's powder to prevent purging.*

Local treatment, usually by dilatation, will also be necessary, and it is astonishing to note how easily this proceeds as soon as the system becomes conscious of the presence of mercury. I have tried smearing the bougie used with mercurial ointment, but the amount so introduced is not sufficient to be of any avail, whilst it is sometimes found to irritate the urethra. For the same reason, I do not employ urethral pessaries, preferring to produce the general effects of the mercurial, which really is all that is required, by one or other of the plans usually adopted for this purpose. When the obstruction is relieved, and the urgency of the distress is over, let the patient be induced to continue anti-syphilitic treatment until obvious signs of the constitutional disorder have disappeared. There is nothing to be feared from the judicious employment of mercury in destroying the activity of syphilis, whilst there is everything to be apprehended from a disease which, if uncontrolled, is sure to follow its own destructive inclinations.

Mr. Marcus Beck † has recently drawn attention to, and collected, instances of primary cancer of the urethra. He records one case under his own observation, and refers to ten others from various sources. In five only of the latter was the diagnosis confirmed by microscopic examination. It is possible, as Mr. Beck remarks, that in some of these the cancerous process might have commenced from the skin opening of a perinæal fistula and not from the urethra. This seems probable, as I have observed in the course of some general remarks on malignant urinary fistulæ in a succeeding lecture. Mr. Beck thus summarises the features of primary cancer of the urethra:—"It occurs in men over fifty who have most commonly suffered from some previous disease of the canal, usually gonorrheal stricture. The most prominent symptom is the gradual formation of a hard lobulated mass round the urethra. Micturition becomes increasingly difficult and is almost always very painful, far more so than in simple stricture. Hæmorrhage, especially before and after micturition, seems to be a common symptom. As the growth extends the corpora cavernosa and their crura become implicated, and the disease advances past the scrotum into the penile portion of the urethra. The glands in the groin enlarge, and the patient becomes cachectic in appearance. The passage of instruments is from the beginning difficult, and is always followed by bleeding. The next stage of the disease is the formation of a foul cavity containing blood-stained, purulent fluid in connection with the urethra. The discharge from this may be recognised escaping from the urethra. As the cavity enlarges, a perinæal abscess forms, which reaches the surface, bursts, and leaves a fistula. The carcinomatous growth then extends to the skin and superficial structures along the line of the fistula."

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* An excellent paper, containing an account of the various modes of administering mercury, by Dr. J. Duncan, appears in the *Edinburgh Medical Journal*, 1877.

† A Case of Primary Squamous Carcinoma of the Bulbous portion of the Urethra. *International Clinics*, vol. ii. Second Series. 1892.

Since reading these remarks, I believe I once saw an instance of the kind some years ago, but I failed to recognise the nature of the disorder. I distinctly remember, however, in addition to the other symptoms, that there was a peculiar sickly odour about the parts which seemed to distinguish this case from any other stricture that I had previously seen. If my assumption is a correct one, the coincidence reminds me of what Professor Hingston, of Montreal, observed, when seeing some patients with him at the Hôtel Dieu :—" I can almost always recognise a cancerous sore amongst the Indians by a characteristic odour which to me is unmistakable." As to the treatment of cancerous stricture, Mr. Beck remarks in reference to his own case :—" There only remains one question : Could any operation have been performed for the removal of the disease ? At the time he came into the hospital the mass was deeply fixed, and could not have been removed without taking away the whole penis with the bulb and the crura and the anterior layer of the triangular ligament. The danger of such an operation in a man of his age would have been very great, and the prospect of avoiding a recurrence, either locally or in the glands, very small. It seemed better, therefore, not to attempt more than palliative treatment by draining the bladder, and the patient derived great comfort from the plan adopted. Had the nature of the case been recognised at a time when the growth had not invaded the triangular ligament the operation of complete removal of the penis might have been undertaken with a fair hope of success. In only one case, that of Mikulicz,* does any attempt seem to have been made to remove the diseased parts, and in that case recurrence took place in a few months."

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* *Wien. Med. Wochen.* 1884. Nos. 20, 21.

ELEVENTH LECTURE.

Consequences of Stricture—Urethral Abscess—Extravasation of Urine—Abscess in relation with the Urethra.

Some of the consequences urethral stricture may occasion now require consideration. Of these, abscess in immediate relation with the place of obstruction and extravasation of urine are amongst the most common. A person who has been suffering from stricture for some years, and has given it but little thought or attention, one day finds a swelling in the perinæum, immediately behind and partly involving the scrotum, of a brawny hardness. Micturition is usually conducted with much difficulty and straining. The swelling having been in existence for some two or three days, after an effort to pass water the patient becomes conscious of something giving way. This is followed by a sense of relief, and probably by the discharge from the penis of a little blood-stained or purulent urine. The scrotum and afterwards the penis commence to swell in a sudden and remarkable manner, accompanied with a sense of skin-tingling and an inability to pass any urine. Under such urgent circumstances we are sometimes summoned to see a stricture case for the first time.

I will now notice what has taken place and the probable consequences if surgical assistance is not promptly rendered. Under the pressure of urine at the point of obstruction the urethra and lacunæ become dilated behind the stricture, and a peri-urethral abscess forms, which eventually makes its way into the canal behind the obstruction. The escape of a few drops of matter is usually followed by an increased sense of irritability, and under a renewed effort to micturate the urine is forced, first into the perinæum, then into the scrotum, penis, and abdominal parietes, the direction being determined by the connection of the fasciæ, as shown in Fig. 5. The penis is generally so swollen that it is almost impossible, where there is a prepuce, to get a sight of the meatus or an instrument into the urethra until an exit has been made for the fluid. This is the course of events where the stricture is situated in the sub-pubic portion of the urethra. When the obstruction is in the penile portion of the canal, the order of proceedings is reversed, and urine will find its way, first into the penis, and afterwards into the scrotum. If the patient does not receive relief, the result will be that wherever the urine wanders the tissues in contact with it—muscles, skin, and cellular tissue—rapidly become gangrenous, and the patient sinks; if, on the other hand, prompt assistance is forthcoming, good hope of recovery, unpromising as things look at the time, may be entertained.

Before proceeding to treat a case of this kind we must be clear as to the objects we have to accomplish; the first is to provide channels of escape for the confined urine, wherever this may be; and the second, to establish a direct communication through the perinæum with the bladder behind the stricture, provided the obstruction is in the sub-pubic urethra. It will always be as well to try if a catheter or grooved staff can be passed into the bladder; this is generally possible, for the latter is now much in the condition as if it had been aspirated, tension being taken off the stricture by the escape of the urine amongst the tissues. The practitioner, in doing this, should not forget that he may be passing his instrument into a bladder which is now empty and contracted, otherwise he may possibly feel embarrassed at not seeing urine escape. Having determined whether an instrument will pass, we next proceed to deal with the extravasated urine. Usually, an incision on either side of the raphé, going down into the œdematous tissues, will suffice for the scrotum, and the same for the penis, if swollen. When this has been done, the parts should be taken within the grasp of the hand and well pressed, as if squeezing out a wet sponge; by this a quantity of urine is got rid of, sloughing prevented, and the parts are reduced to something like their normal dimensions. Wherever urine has travelled, as evidenced by the tension and crackling that may be felt by the hand, incisions must be made into the cellular tissues. Any spurting skin-vessels may be tied, but there is usually no hæmorrhage, for as the urine escapes the tissues begin to contract.

We must now endeavour to accomplish the second object, and make a direct communication through the perinæum with the urethra behind the stricture for bladder-drainage, assuming, as I have said before, the obstruction occupies its common position. This is a most important principle in the treatment of all cases where sloughing is likely to follow extravasation of urine. Where a grooved staff can be passed it is easily accomplished; but if only a small instrument, such as the guide of a Maisonneuve's urethrotome, can be used, an internal urethrotomy may first be done, then the grooved staff follows, and the section and the insertion of the drainage-tube into the bladder are completed. The fact that extravasation of urine is present in no way alters the principles of treatment, in so far as they relate to the provision of bladder-drainage as previously described, in connection with external and internal urethrotomy combined.

A word or two in reference to those cases where, with extravasation of urine complicating stricture, the practitioner finds it impossible to pass an instrument or guide into the bladder. How is he to accomplish the second object connected with the treatment of these cases upon which stress has been laid? Under such conditions, and owing to the state of the parts, Wheelhouse's operation is inappropriate. As a rule, the place where the urethra gives way is within a short distance of the point where the catheter or staff is obstructed, and it is in this direction that he should open the perinæum along the median line with some freedom. If he will then introduce his finger, and carefully feel about, he may often detect the line of the urethra, and by the use of his finger-nail insinuate a way through it into the bladder. Under these circumstances, I have never experienced much trouble in putting a drainage-tube into the bladder from a perinæal section, independently of whether I have been able to pass a guide or not. It seems easier to do this in cases of abscess and extravasation than where it is undertaken for the treatment of an ordinary impassable stricture. I know it is the practice of some surgeons to trust merely to a central perinæal incision as affording a sufficiently reliable vent, without demonstrating, either by the introduction of the finger or a drainage-tube from the wound into the bladder, that the communication is both direct and free. However, where a drainage-tube can be put into the bladder without much trouble it is, I believe, better; when the passage cannot be readily made it is wiser to trust to the incision alone than to incur risks which must obviously be connected with too much digital or instrumental searching. The position of the opening in the urethra, behind the stricture, through which the urine has escaped may sometimes be determined, after the perinæum has been opened, by making pressure above the pubes, when urine may be seen to escape into the wound; this often proves an important guide. These two conditions being fulfilled, it is astonishing how rapidly convalescence generally takes place. If there is a good drainage, there are neither rigors nor fever afterwards.

That urine may be extravasated without causing destruction of the tissues with which it is in contact is evident from a case which came under my notice. It was one of stricture, with extravasation of urine into the scrotum, occurring in a person suffering from Bright's disease of the kidneys. Though the extravasation had come on suddenly, and had existed for twenty-four hours unrelieved, there were no signs of acute inflammatory action and commencing gangrene, such as are usually expected. However, the tension being considerable, the parts involved in the extravasation were incised. As the fluid escaped from the incisions, it was noticed that it had not the strong ammoniacal odour which is so perceptible in such cases. I was somewhat puzzled for an explanation, as I felt sure that the case was one of extravasation, and not of acute scrotal œdema. How was it then that extravasated urine failed to create gangrene? I collected some of the fluid as it trickled through the wound, and compared it with that subsequently drawn off by the catheter. These were found to be identical, and in both there was an almost complete absence of urea. This then, to my mind, solved the mystery, and explained that as there was no urea to decompose, there was no source for the production of the ammonia by which the destruction of tissues in connection with extravasated normal urine is effected. By the absence of urea the urine was rendered chemically harmless to the tissues with which it came in contact.

There is one sign in connection with extravasation which is usually regarded as fatal. Brodie states:* "Sometimes a black spot may be seen on the glans penis; it is a most fatal sign, for I never knew one to recover in whom it appeared. It indicates that the urine has been effused into the cells of the corpus spongiosum." I have seen two examples of this, in each instance with a fatal result. In both, the means provided for the escape of urine from the tissues seemed very insufficient.

Extravasation of urine, when it occurs in young male children, is generally caused by the impaction of a calculus in the urethra, the urine escaping into the cellular tissue of the scrotum and abdomen, and producing the same effects as occur in the adult. In one case it was due to an extremely contracted phimosis. The principles of treatment are the same: remove the obstruction in the urethra, and make artificial channels for such urine as may have passed amongst the tissues.

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* Brodie on the *Diseases of the Urinary Organs*, p. 14.

I have also met with instances in male children where this symptom was directly due to the sudden blocking up of the urethra with portions of membrane and caseous matter thrown off from a tubercular bladder or kidney. In one case where I had to open the perinæum for extravasation of urine in a boy aged 14, who was placed under my care by Dr. Fleetwood, I feel sure the retention, ulceration, and subsequent extravasation were caused by the urethra becoming impacted with débris of this nature. Such symptoms warrant the performance of perinæal section, not only for the purpose of affording immediate relief, but to permit of the discharge of cast-off materials from the bladder or kidneys, which, by reason of their bulk, cannot find a ready exit along the natural passage.

In the case of an adult male I saw in consultation at the Bootle Hospital, a large calculus made its escape in this manner. The patient was admitted with a sloughing scrotum and extensive extravasation of urine. The latter was relieved by incision, and from the scrotum, amidst a sloughy mass, a phosphatic stone, weighing eighty grains, and moulded to the shape of the prostatic portion of the urethra, was removed. This, undoubtedly, had been the cause of all the trouble. The patient made a good recovery. An examination of this calculus showed that it must have been in the urethra for a considerable time before it gave rise to serious symptoms of obstruction, as the wave-like lines of the formation indicated its increase by successive phosphatic depositions as the urine flowed out.

The possibility of an impacted stone in the urethra behind a stricture must not be lost sight of as a cause of extravasation of urine in the adult. In fact this contingency furnishes another reason why in cases of urinary extravasation a direct communication with the deep urethra, and an exploration of the bladder with the finger, should be regarded as a necessary part of the treatment. A case very forcibly illustrating this point has recently been recorded by Mr. Thistle.*

In the after-management of these cases of extravasation it is important that the strictest cleanliness should be insisted upon. Where there is much sloughing the wounds are necessarily offensive, and care is required to keep them sweet. They should be syringed out regularly with tepid carbolic lotion, of the strength of one part of acid to eighty of water. In using carbolic acid in the local treatment of urinary affections, it is well not to have the solutions, be they oil or water, too strong, or they may occasion discoloration of the urine, which, though unattended with ill effects to the patient, is apt to create some alarm. Charcoal poultices are the best application during the separation of the sloughs, and, after this, water dressing, or some slightly stimulating lotion. I usually have the patient well packed between the thighs and elsewhere with tenax or wood-wool pads. If destruction of the scrotum to a great extent has taken place, advantage may be gained, after the sloughs have separated, by drawing the parts together with strapping. It is of importance to syringe out the anterior portion of the urethra by the external meatus, allowing the fluid to escape through the perinæal opening. In insisting upon attention to general hygienic measures, it must be remembered that septicæmia is the common cause of death after extravasation. That sickly urinous smell which so often hangs about the apartment of the urinary invalid is not uncommonly due to a want of cleanliness and ventilation. Where there has been much damage done by extravasated urine, the patients are apt to pass into a low typhoid state, and require stimulants, bark, and highly nutritious fluid food. The nervous irritability which is so frequently observed is best relieved by small doses of morphia, administered hypodermically.

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* *Lancet*, Dec. 10, 1892.

In connection with this subject reference may here be made to certain cysts which have been found in the perinæum and scrotum. These are formed, it is stated, by "urine extravasating through very small perforations in the urethra, and causing the exudation of inflammatory products which assume a tumour-like character." Cases of this nature have recently been recorded by Kazewski* and Mr. H. W. Page.† I have met with an instance, but could not directly connect the cyst with the urethra, as no amount of pressure seemed to diminish its size. This would be expected if the cyst had a direct communication with the canal. I think it more likely that these collections of fluid, containing inflammatory products, are caused by the leakage through the urethral walls of some of the products of urine, as I have already illustrated in connection with the pathology of stricture, for, as Page remarks, "cyst-like though they be, their walls have practically no more separate entity than the pyogenic membrane of bygone days." When inconvenient from their size, these sacs may be opened and made to heal by granulation, which they appear to do without exposing the patient to the risk of a urinary fistula.

My remarks hitherto have had reference to abscesses connected with stricture. Abscess may occur independently of a stricture in any of the tissues in relation with the urethra. It may be caused by such irritants as the gonorrhœal discharge, improper injections, or the passage of instruments along the urethra. When there are signs of local inflammation, means should be taken, by the employment of leeches, fomentations, and other emollients, to procure resolution, but there must be no hesitation in giving escape to matter should there be indications of its formation. Unless this is promptly done, it may burrow into the urethra, and damage may result. Inflammatory exudation, when it occurs round the membranous portion of the urethra and between the layers of the fascia in connection with it, sometimes gives rise to the impression that abscess of the prostate is impending. I believe that a suppurating prostate is an affection far rarer than the text-books would lead us to believe. A careful examination of the rectum, with the index finger feeling the prostate, and the thumb of the same hand on the perinæum, is the best way of determining the position of inflammatory exudation in this part, and so of avoiding the error referred to.

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* *Centralblatt für Chirurgie*, No. 32, 1887.

† *Medical Chronicle*, vol. vii., Manchester.

Where there is no stricture, and the exudation around the urethra is not sufficiently pressing to cause retention of urine, the surgeon's endeavours to procure resolution may with safety be prolonged until the existence of pus is indicated by the sense of fluctuation. A rigor may not indicate much, as it is often observed that a slight interference with the act of micturition is sufficient in some persons to produce it. In cases of stricture with retention of urine, and inflammatory swelling in relation with the urethra, it is proper to anticipate the formation of matter by an incision, as the propulsive efforts of the patient, added to the tension already thrown on the urethra by the inflammatory peri-urethral exudation, may result in that rapid ulceration of its walls which so often precedes extravasation of urine. The distinction I have thus endeavoured to draw has not unfrequently enabled me to depart from that rule in surgery which renders imperative the early incising of inflammations in proximity with the urethra. In opening an abscess in the perinæum, the result of gonorrhœa or such-like irritations, where there is no stricture causing retention, care must be taken not to open the urethra, as this procedure introduces an unnecessary element of danger, from which a simple perinæal incision is free; for even if, under these circumstances, the abscess should by ulceration make its way into the urethra, all risk of extravasation is avoided by the opening which has been made.

TWELFTH LECTURE.

Rupture of the Urethra.

Rupture of the urethra, either partial or complete, is an injury of a serious nature, as it exposes the patient to some immediate risks arising out of retention of urine under circumstances where catheterism is almost sure to be difficult; and further, it lays him open to the likelihood of having as a permanency a stricture of the worst and most unmanageable kind. This lesion is usually caused by blows on the perinæum or adjacent parts, such, for instance, as those incurred by falling from a height astraddle, or, in fact, by any violence applied over the line of the urethra. Not unfrequently, it is occasioned by horsemen being thrown suddenly forwards and striking the sub-pubic region with the pommel of the saddle. I have known it happen the same way by a fall on the saddle of a bicycle.

In investigating injuries involving the parts constituting the neck of the bladder, including the membranous urethra, I have experienced difficulty in satisfactorily explaining how it was that the membranous urethra was sometimes ruptured without fracture of the pelvis coexisting, whilst there was no evidence that the perinæum had ever been struck. In treating of rupture of the urethra, Bryant refers to this point in the following words: "In not a few instances the injury [ruptured urethra] has been produced by the passage of a cart wheel across the pelvis. It is somewhat difficult to understand how such a result can be produced by such a cause, unless some fracture of the pelvis coexists; but explain it how we may, in practice we meet with cases of ruptured urethra following upon the passage of a wheel across the pelvis, and unconnected with any other symptom of its fracture." * In some instances of ruptured urethra I have seen in young subjects, where the force has been applied to the sides of the pelvis, as in crushes and squeezes, and not to the perinæum, as is more commonly the case, I feel sure that the tearing of the urethra more or less across is occasioned by the bowing or bending forward of the pelvis at the symphisis pubis under pressure applied laterally. In this way, by the sudden elongation of the antero-posterior diameter of the pelvis the urethra is put on the stretch, and gives way at or about the point where it passes through and is fixed to the deep triangular ligament.

The nature of the case is generally indicated by blood escaping from the meatus of the urethra, and by inability to urinate. I have rarely seen extravasation of urine to any appreciable degree follow immediately upon it. Where the laceration is at all extensive, or where the canal is entirely torn across, retention is complete. What the termination would be if the case were to remain unrelieved, I cannot say from personal observation; I suppose the urine would eventually become extravasated amongst the tissues adjacent to the point where the tear was, and thus escape by acute sloughing, rather than the bladder be ruptured by over-distension. Mere contusion of the urethral walls, following a blow, must not be confounded with rupture; the introduction of a catheter usually determines this, and in forty-eight hours or so the contused parts resume their normal function.

Extravasation of urine from a ruptured urethra, and the disorganisation of the parts that ensues, may be somewhat simulated in appearance by extensive ecchymosis of the scrotum and penis from an injury to the former. A patient was admitted under my care in 1887 who had been kicked in

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* *The Practice of Surgery.*

the scrotum by a powerful man. He had complete retention, and all the parts, including the perinæum, scrotum, and penis, were enormously swollen and discoloured from extravasated blood. As a catheter passed easily the urethra was concluded to be intact, and in the course of a week, by carefully drawing off the urine, the function of micturition was restored, and the patient made a rapid recovery. About the same time, I saw an officer on one of the large Atlantic liners, who had been struck by a heavy sea and swept along the deck, when the vessel was travelling at a great speed. I saw him two days after the accident, in consultation with Dr. Finucane, the surgeon of the ship. Though the penis, scrotum, and adjacent parts presented a shapeless mass from extravasated blood, and there was retention, I fully concurred in the diagnosis arrived at previously, that no fracture of the pelvis or rupture of the urethra had been occasioned. The extravasation of blood had produced a condition of extreme tension in the part involved, but absorption and recovery took place without any breach of surface happening. The combination of extravasated blood and urine would very speedily manifest itself, and call for prompt and different treatment.

In referring to the anatomical arrangement of the fasciæ in relation with the urethra and bladder, Dr. Barron remarks: "It is to be noted how easy it would be, in a case of ruptured urethra involving either the whole circumference of the tube, or its anterior aspect only, to pass a catheter into the pre-vesical space, and finding the point quite free and movable, and no urine being discharged, to suppose a ruptured bladder."* I have known this happen in practice, and occasion some embarrassment to the operator.

I will now narrate a few selected cases, as illustrating points it is desired to make prominent in connection with the treatment of this injury.

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* "Arrangement of the Pelvic Fascia," *Liverpool Med.-Chir. Journal*, January, 1885.

Case I.—A labourer, aged 20, was admitted into the Northern Hospital, Liverpool, under my care in 1866. Eighteen hours before admission he had received a kick on the perinæum. Blood issued from the orifice of the urethra, and he shortly afterwards found himself unable to pass water. For this he applied at the hospital. With some difficulty a No. 7 catheter was introduced, a distinct laceration being felt about the bulb. Two pints of bloody urine were removed, and the catheter was then retained in the bladder. No further difficulty was experienced. The patient made a good recovery. A contraction about the lacerated part ensued, and for several months he attended as an out-patient for the purpose of having the urethra dilated. Eventually he was lost sight of, some contraction remaining.

Case II.—A dock labourer was admitted into the Northern Hospital under my care in 1866, having fallen from a height astride over some scaffolding. On admission the perinæum was bruised, and blood was passed by the urethra. On introducing a catheter, a rupture of the urethra, about the triangular ligament, was made out. The laceration did not appear completely to sever the urethra, for with a little trouble the catheter was introduced into the bladder. In this position it was retained, and up to the fifth day the patient appeared to make satisfactory progress. On this day, however, the patient became feverish; the perinæum was found swollen, and there was much pain about the part. Under these circumstances I opened the perinæum, and gave vent to disorganised clots and some fœtid pus, with immediate relief. On the ninth day from the injury there was a rigor, and the patient succumbed, with well-marked symptoms of pyæmia. I was only able to inspect the injured part after death, when I found that the urethra had been almost completely, though irregularly, ruptured in the membranous portion. There were also signs of rapidly extending pelvic cellulitis.

Case III.—About the same time as the previous case a sailor was under my care for very similar injuries caused by falling across a rope. Here the signs of a rupture of the urethra in its deeper part were equally unequivocal. With some difficulty I introduced a grooved staff, and freely laid open the perinæum and urethra to an extent sufficient to secure a free vent for the urine. The patient made a good recovery, and the perinæal wound completely healed. During the healing process bougies were regularly introduced. I saw the patient not long ago, and he appeared to suffer no inconvenience from his accident. The urine was voided in a natural stream.

Case IV.—A 'bus conductor, aged 17, was admitted into the Infirmary under my care in 1869, with the following history. Seven days before admission he was kicked on the perinæum; this was followed by slight hæmorrhage from the urethra, but he was able to pass his water. On the day of his admission to the Infirmary (the seventh from the accident) the hæmorrhage recurred, and he had retention of urine. A No. 9 catheter was introduced, and a considerable quantity of urine withdrawn. Two days after this he became feverish, the perinæum was swollen, and there was some pain about the part. To relieve this, a free incision was made into the urethra along the central raphé, through which all urine passed. This was followed by relief. He made a good recovery, and left the Infirmary with the perinæal wound completely closed. The urethra appeared to be lacerated about the membranous portion along its lower wall. During the process of healing bougies were introduced in increasing sizes. He left the hospital with a urethra admitting a full-sized bougie, and I never heard afterwards that he suffered from stricture.

Case V.—A stonemason was admitted into the Infirmary under my care in 1870. He had fallen across a sharp stone, considerably bruising his perinæum. On his admission he had the usual symptoms of lacerated urethra—viz., blood issuing from the orifice of the urethra, and retention of urine. A catheter disclosed a considerable rupture about the deep perinæal fascia. I accordingly laid open the perinæum freely in the middle line, giving exit to clots, and forming a passage for the urine to escape. The patient had a rather sharp attack of orchitis, but with this exception made an excellent recovery. The treatment consisted in the regular introduction of bougies whilst the perinæal wound was healing. When he left the Infirmary the wound was closed, and the urethra of its natural size. I saw him some months afterwards, and he had remained quite well, without any sign of stricture.

In reference to the question of treatment, the cases recorded justify the conclusion that in all such injuries external incision, or, as commonly called, perinæal section, is the safest plan of proceeding, for the following reasons :—

Firstly, because of the impossibility of accurately determining the extent and direction of the laceration without exploration. The relative position of a laceration to the deep perinæal fascia is a matter of paramount importance. Were it possible in all cases to ascertain that the lacerated portion was anterior to the deep fascia, provided a catheter could be introduced into the bladder, it might by some be considered safe to treat the injury without incision, resorting to such a proceeding should signs of extravasation of urine appear; for, under the former circumstances, the direction taken by extravasated urine is forward towards the scrotum, where it renders itself unmistakably apparent from the moment of its occurrence. Where the laceration is behind the deep fascia, the extravasation, should it follow either immediately or in the course of a few days, is of a much more serious nature, as the urine takes a backward direction towards the pelvis, setting up cellulitis, which speedily goes on to suppuration. Here it is more subtle; it may be going on from the moment of the injury, not declaring itself until it has occasioned symptoms of pelvic cellulitis.

The former variety of extravasation is usually amenable to treatment, but the latter is most frequently followed by a fatal result. Case II. illustrates this, and Case IV., though the patient was saved, is a similar example. As the precise position of the laceration, whether it be a few lines in front of the deep fascia or a few lines behind it, determines in a great measure the after-consequences, so far as suppuration is concerned, is it not better to act on the safer side in these cases of deep laceration, and anticipate the risk of retrograde inflammation?

Further, it must not be entirely forgotten that the exploration, where feasible, of the damaged part of the urethra enables us to utilise a method of treatment which is now being applied, with conspicuous success, to almost every variety of ruptured tube within the body which is accessible. I mean an attempt to obtain their primary union by suture. From what I have seen of these injuries I am disposed to think that there is a limited field open to its application in connection with the urethra. My friend Mr. Bruce Clarke has enabled me to refer to a case of his own, illustrating this point. It was that of a man with a complete and clean rupture of the urethra from injury, the ends of the canal being found, on exploration by a perinæal incision, widely separated. Upon a staff carefully guided into the bladder along the whole length of the urethra the separated ends were brought together and accurately adjusted by suture. Immediate union resulted, and, after some months' interval, no stricture has been observed. I believe Mr. Barling has also adopted this practice. This point has already been referred to indirectly in connection with the treatment of certain strictures by excision.

Secondly, because incision is the surest means of preventing extravasation of urine. No other plan than that of opening up the injured spot, and thus forming a direct course for the urine to escape, can be relied upon. In instances where the urethra is completely torn across it is usually impossible to introduce a catheter, and here, under all circumstances, the line of action is evident enough. It may be objected that where a catheter can be introduced incision is unnecessary, but it must be remembered that the constant presence of such an instrument in the bladder is not necessarily a safeguard against the occurrence of extravasation, whilst its pressure on the swollen and inflamed urethra at the part injured is not unlikely to be followed by sloughing of the canal and a proportionate extension of any subsequent stricture.

Thirdly, because incision diminishes the risk of a stricture forming, or, at all events, moderates the severity of such a formation. It may be generally stated that the worst forms of stricture are commonly those following laceration of the urethra, and considering the circumstances under which such lesions heal, where no artificial vent is provided, this is not to be wondered at. The wound in the urethra is usually of a more or less lacerated character; it heals under the irritating influence of constant contact with urine, and an inordinate amount of plastic exudation is invariably thrown out around it. On the other hand, in cases where the urethra, when lacerated, is opened by perinæal incision, we have still the original injury, but the circumstances are more favourable for limiting action. Free exit is here given for all matters of an irritating nature, and the exudation lymph is merely sufficient for coating over the incised tissues. That stricture need not necessarily follow rupture of the urethra I have no doubt. As a matter of fact, I have observed from a considerable number of cases that rupture of the deep urethra, treated by perinæal section and bladder-drainage, whether a catheter can in the first instance be passed or not, is seldom followed by stricture, whereas, where no such incision is made, a tight contraction almost invariably follows.

Fourthly, because the risk of poisoning by toxic urine is materially diminished. What I mean by this is that the patient's chance of dying rapidly with physiological symptoms of poisoning by some urine combination absorbed by the wound is thus reduced to a minimum. Let me give an illustration of this, to which I could add others :—

Case.—On August 4, 1886, I was asked by Dr. E. T. Davies to see a boy, aged 11. The history of the case was as follows. About thirty hours before I saw him he had fallen astride some sharp kerbstones, and there could be no doubt that he had sustained a rupture of the urethra, though he did not complain until the following morning, when he was seen by Dr. Davies, who at once suspected that something of this kind might have taken place. The boy stated that he had passed water, but on the doctor asking him to do so in his presence he was found to be unable. There was no sign of injury to the perinæum, but a little blood was escaping from the penis. Catheterism having been tried later on, I was asked to see him that evening. He seemed very well in himself, but he had a distended bladder, and could not pass water. With some little trouble I managed without force to slip a No. 5 elastic catheter into the bladder, in doing which I recognised the nature of the injury. About a pint and a-half of highly blood-stained urine was removed; the catheter was tied in and the patient put to bed.

On the following morning he was visited by Dr. Davies, who found that he had had a restless night, a good deal of pain, and a temperature of 102° F. The bladder was washed out with warm water. About four o'clock the same afternoon Dr. Davies was hastily summoned, and found the patient in severe convulsions, and absolutely unconscious. The temperature was then 105°, and the catheter, which had been draining freely throughout the night, was removed. He could not swallow, the fits recurred with much violence, attended with opisthotonos, and he became comatose and died at midnight—that is to say, about twenty-four hours after I saw him and the catheter had been tied in.

Though at some previous date the patient appears to have suffered from difficulty in breathing, for which Dr. Davidson and Dr. F. Semon had been consulted, at the time of the accident he was in good health. Dr. Davies observed that though the flow of urine *through* the catheter was free, yet quite as much escaped along the canal by the side of the instrument. When a convulsion was on the urine was squirted out both through and by the side of the catheter; there was no retention from the time the instrument was introduced up to death. Dr. Davies observes: "When in actual convulsion the pupils would contract to pin-point size, and when out of the fit would dilate immensely, so that the corneæ were absolutely obliterated." An hour before his death he had a temporature of 104° F. Unfortunately, no *post mortem* could be obtained.

This case does not stand alone in my experience as a fatal instance of poisoning by toxic urine. This is a point which I have so fully discussed in a previous lecture that I shall not further allude to it; suffice it to say, that I am sorry I did not perform a median cystotomy, and allow the urine to run out just as it does after a lithotomy. I have never regretted adopting this practice.

Retrograde hæmorrhage into the bladder, and the formation within the latter of large clots which may undergo decomposition and become septic when mixed with urine, not unfrequently occur, both with partial and complete rupture of the deep urethra. In one case of the kind, where I opened the perinæum and exposed the ruptured portion of the canal, I caused the bladder to expel, by the pressure of my hand over the pubes, about half a pint of large blood-clots, which escaped per urethram by the wound I had made. The process reminded me more of emptying the uterus of blood and clots after parturition in a similar way. To have done this without opening the perinæum would have been impossible, and further, the patient by retention of these clots would not only in all probability have suffered from vesical colic, but would have run a good chance of dying from putrefactive septicæmia. He made a complete recovery, and no stricture was to be detected two years afterwards.

Longitudinal incised wounds of the urethra are not ordinarily followed by stricture. We have an illustration of this in the operation of lateral lithotomy, where the formation of a stricture consequent on incision into the urethra is a rare event, and when it does occur, is probably traceable to some laceration or contusion of the passage in extracting the calculus. The following case may be mentioned as a further illustration of this observation:—

Case.—In 1866, a patient was admitted into the Northern Hospital, under my care, suffering from an incised wound of the perinæum, received in the course of what was described as "a free fight," further details of which were not to be had.

The wound was just behind the scrotum, and was very similar in appearance and direction to that which a surgeon would make in opening the urethra in this position. It was a little to one side of the raphé, and was an inch and a half in length. Some hours elapsed before the patient was brought to the hospital. I found the wound plugged with lint, and blood was issuing from the penis. As the bleeding was free, I had to enlarge the wound to enable me to secure what I believe was the transverse perinæal artery. This was sufficient to arrest the hæmorrhage. I could put my finger into the urethra, which had been very neatly incised for about an inch along its floor. Urine escaped freely through the penis, and partly through the wound, for some three or four days. After this time the urine was passed naturally, and the wound closed. I saw the patient about two years afterwards, when he had no sign of stricture, or other indication, beyond the scar, of the injury he had received.

To sum up in regard to treatment: cases of ruptured urethra in the male may, like strictures requiring perinæal section, be divided into two classes: (1) where an instrument can be passed into the bladder, and (2) where it cannot. As I have already given my reasons, with some proofs, I consider that the best practice, as a rule, in the first class of cases is to introduce a staff, or an instrument, and to cut down upon it freely by a median perinæal incision, assuming, of course, that the injury is in the usual place, namely, the sub-pubic urethra. There is no necessity to introduce a drainage-tube so long as the urine escapes; it is, however, a wise precaution to take. For the second class of cases, the instrument should be passed as far as it will go, and the same proceeding practised as in the first class of cases. If you expose the end of your instrument by the incision, the proximal end of the urethra, if completely torn across, cannot be far off. The latter can usually be discovered by pressing above the pubes, when urine or clots may be seen to escape, marking the position of the tear, or the proximal end of the divided canal. By this practice, in these two classes of cases, we place the patient, both immediately and prospectively, much in the same position as after a lithotomy.

Ruptures of the pendulous portion of the urethra are more frequently caused by such violence as contact with hooks and sharp instruments of this kind. Where there is an external wound, this may be accurately approximated with fine sutures. An antiseptic dressing, and the retention of a soft rubber catheter for continuous urine-drainage, usually suffice to effect repair, unless the parts are so much damaged as to slough. When this happens, the case will be treated as one of urinary fistula. The conditions under which rupture of the penile portion of the urethra occurs, and the processes necessary to bring about repair, obviously differ from those which are applicable to the deep portion of the canal.

Before leaving the subject, I will refer to what seems best to be done when the accident happens to a person beyond the reach of professional assistance, or where the circumstances are such as to render the operative proceedings recommended out of the question; for instance, to persons at sea, and elsewhere, I have known this occur more than once and the cases brought to a successful issue in spite of their serious nature.

My former colleague, Mr. Mitchell Banks, had under his care a patient who ruptured his urethra by an injury at sea. As the surgeon of the ship could not pass a catheter, when the bladder became distended he punctured it above the pubes, and retained the cannula in this position until the vessel reached port, and the patient could be admitted into the Infirmary. Mr. Banks, by a perinæal operation, re-established the continuity of the urethra, and the patient made a good recovery. In another instance, this accident happened to the master of a ship, who fell over some rigging some days after leaving port for a long voyage. Recognising the nature of his injury, after various experiments had failed him, when retention of urine became extreme, he asked his

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mate to run a penknife into his bladder above the pubes. This was done with complete relief; a urinary fistula followed where the incision had been made, and the captain resumed his work in less than a fortnight from his accident. At the end of four months' voyage he was so used to the new passage for his urine that, on his return to England, after two years' absence, he would never allow anyone to attempt to efface his own surgery. Though strongly of opinion, as a rule, that cases of rupture of the urethra are safer, both immediately and remotely, with an opening in the perinæum for urine-drainage until repair has taken place, than they would be with retained catheters passed along the wounded canal, there are instances where it may be difficult to decide at once that the lesion is not a mere contusion, or bruising, which may be safely left to heal with the assistance of a catheter. In a doubtful case of this kind I should advise bladder-drainage to be employed by the continuous wearing of an unplugged catheter with tubing, after the plan recommended by Professor John Chiene.* Here the urine escapes into an antiseptic fluid just as fast as it runs out of the ureters.

Where the urethra has been completely torn across, and it is necessary to open the perinæum to allow the urine to escape, I know it is the opinion of some surgeons that the healing process should proceed with a catheter inserted the whole length of the canal for the purpose of securing the correct apposition of the torn ends. This has also been used as an argument in favour of suturing the divided ends of the urethra under such circumstances. My impression, from what I have seen of the management of these cases, is that with a free perinæal drainage they may be left to repair like a lithotomy, with a good prospect both of correct apposition and the formation of a scar which shows but little tendency to contract.

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* *Edinburgh Medical Journal*, December, 1880.

In the after-management of cases of ruptured urethra great attention should be paid to cleanliness, to secure which the wound should be syringed out at least twice daily with weak carbolic lotion. I know of no better application to the perinæum than tenax; it absorbs the discharge and acts as a disinfectant. After the lapse of a few days the introduction of bougies along the whole length of the urethra should be commenced, and continued at regular intervals. When the wound has healed, the patient may be instructed how to introduce an instrument for himself, the use of which he should continue, to prevent any contraction of the urethra taking place.

The following case of rupture of the urethra was attended with a state of priapism, which lasted for three weeks :—

Case.—W. M., aged 22, was admitted into the Royal Infirmary, under my care, on October 29, 1879, with an injury to the penis and scrotum, caused by a kick four days previously. He stated that on receiving the injury he passed some blood from the urethra, and had continued to do so. On admission there was considerable ecchymosis of the penis and scrotum, and the penis was erect. From an examination of the urethra with a bougie, a partial rupture was made out four inches from the orifice. The patient was kept in bed, and evaporating lotions were applied. A marked state of constant priapism continued for three weeks, when it gradually subsided, and the patient left the Infirmary on December 1, 1879.

In relation with this subject, a curious case is related by Mr. Hulke,* where well-marked persistent priapism followed connection, which took place whilst the man, aged 34, was more or less intoxicated. This condition existed for something like twenty-eight days, and was finally subdued by the continuous application of ice. Commenting upon it, Mr. Hulke observes: "A probable explanation of the case is that owing to the maladroitness incidental to intoxication, the organ received a wrench that produced a partial laceration of the attached part of the left crus (where there was much pain), which was, in short, sprained. The injury was attended with extravasation of blood, and followed by inflammation."

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* *Lancet*, Feb. 18, 1888.

THIRTEENTH LECTURE.

URINARY FISTULÆ COMMUNICATING WITH THE URETHRA, AND THEIR TREATMENT.

FOLLOWING upon the consideration of urinary abscess and injuries to the urethra, it will be convenient to notice certain results which these sometimes occasion. A urinary fistula may be defined as a sinus communicating with the urethra or other part of the urinary tract through which urine escapes. I shall confine myself in this lecture to fistulæ in connection with the urethra, and, by narrating typical examples, endeavour to illustrate their varieties and treatment.

The first kind is not unfrequently seen following gonorrhœa or urethritis. A man suffering from this on retracting the prepuce notices a swelling on one side of the frænum. This suppurates, and either bursts spontaneously or is incised. Eventually, a little sinuous passage is left, opening by the side of the prepuce, which is annoying from the fact that it refuses to heal, and a few drops of urine escape by it each time micturition is performed. This, in the case of most men of cleanly habits, amounts to an intolerable nuisance. Persons are apt to associate this trouble with the incision that was made as either being at the wrong time or place. I do not think there is much in this, as the incident quite as frequently happens when the little abscess is left to open spontaneously. Not much good comes out of cauterising these crevices or slitting them up; the latter proceeding often seems to leave them larger and more troublesome than they were before. I have met with several cases where these fistulæ have healed soundly and rapidly after a downward division of the meatus urinarius, a little operation which can be quite easily done under a cocaine application; but care must be taken that the incision so made is not allowed to close up. The patient thus exchanges his fistula for an outlet somewhat larger than the natural one, an exchange which he has no cause to regret. These openings are often kept up by the few drops of urine which remain behind as the pressure of micturition subsides and the orifice of the canal closes. On the same principle, it is sometimes impossible to cure a chronic gleet without the division of a tight meatus.

The second variety of fistula is that which results from the formation of an abscess in connection with, or rather immediately behind, a stricture in the deep urethra. It is usually in the middle line, and leaks more or less every time the patient urinates. Now here the inconvenience is much more than in the first variety, and amounts to this: Either the patient goes about his business or his pleasure with pads on his perinæum and bandages round his person, by means of which he hopes to minimise the annoyance caused by the leakage into his garments when urinating in the ordinary standing position; or he draws off his urine with a catheter when he requires to empty his bladder; or he never urinates except on a commode. These various degrees of annoyance do not require further comment. Taking cases of this kind that have been under treatment, it may be concluded that it is nearly impossible to obtain sound repair of a fistula so long as the urethra is to any appreciable extent strictured in front of it. Remove any contraction, by dilatation or otherwise, and if the fistula is a direct one, and unattended with an appreciable degree of loss of substance—as from sloughing after abscess, extravasation, or operation—it cannot fail to heal. If the fistula is indirect or rendered patent by destruction of tissue other means may be necessary, as will be noted further on. In illustration of the condition under consideration, let me take the case of a middle-aged man recently treated for a single, leaking, direct, median, perinæal fistula of many months' standing following an abscess in connection with the urethra, which had been opened by incision. For this state of things the retention of a rubber catheter and continuous drainage of urine had been tried, but, as is often the case, without avail. The patient had a stricture in front of the fistula, which, though it seemed to dilate under treatment, did not really do so; that is to say, whatever length the intervals were between the dilatations with bougies, you invariably felt, though using fairly large instruments (Nos. 8, 9, or 10 E., and upwards), you were beginning over again. There was always a feeling of unnatural resistance to the touch. By-and-by, I performed an internal urethrotomy for him, freshened up the fistula, and within ten days the latter was soundly healed, and has remained so. In this class of cases, after all obstruction has been removed from in front of the fistula, repair of the latter may be promoted by requiring the patient to cover the orifice of it with the tip of his finger (protected by a little surgical wool or pad of lint), and to exercise just sufficient pressure to prevent urine escaping by the false route during and immediately after micturition. This, when carefully and constantly done, often succeeds where persistent catheterism has previously failed. The latter, though it empties the bladder, leaves the deep urethra full of moisture, which follows the wake of the instrument as it is withdrawn, and leaks out by the fistula after the patient has adjusted his clothing. Under these conditions I have now and then used an electric wire cautery to the fistulous track with advantage. This treatment, however, is not of much good if the sinus is tortuous.

The third variety is where the fistulæ are multiple, or if solitary the connection with the urethra is by a tortuous route. These are usually situated in the perinæum, rather to the side of the median line, in the scrotum, within the limits of the pubic hairs, or even as far back as the ischio-rectal lines. As a rule, the parts involved are of a fibrous or cartilaginous hardness, and are soddened with the products of long-continued urinous inflammation. These fistulæ, from their number and position, have been referred to as "the watering-pot" variety. I do not think I ever saw a more miserable object than was presented to me some time ago in the person of a man who had seven of these openings in the parts mentioned. In a more recent case I treated, the patient had two of these fistulæ, one by the side of his scrotum, the other almost as far back as the anus.

This third variety requires altogether different treatment to the two varieties already considered. Here, as a rule, you cannot remove the fistulæ by merely dealing with the stricture. The one does not necessarily follow upon the other by reason of the form of these sinuses. It is, however, feasible to provide a condition under which it is impossible for any urinary fistula to exist. Deprive the fistulæ, as it were, of their means of living and they will spontaneously close, just as surely as an anal fistula will when the muscular force, by which it is sustained, is withdrawn. It is from this standpoint alone that certain varieties of urinary fistulæ can be approached with the least chance of success. This is to be done by the formation of a central perinæal drain, through which all urine can spontaneously escape as soon as it enters the bladder. If the urine has to be *forced out* by the bladder it is quite sure to find its way into the fistulæ. A perinæal puncture on a grooved staff, the introduction of a suitable drainage-tube, and the subsequent management of the latter, are the conditions upon which reliance is placed under these circumstances. If there is a stricture, and there nearly always is one, this must be effectually freed, and at the same time the necessary puncture for bladder-drainage can be made. The details of this operation have already been described in the eighth lecture, in connection with the treatment of certain forms of stricture by external urethrotomy and perinæal puncture combined. In both the instances referred to at the end of the previous paragraph, where seven and two fistulæ were respectively present, this method was adopted with complete success. The patients were well, with their fistulæ and puncture wounds soundly healed, one within three weeks and the other within four from the time of operation. These fistulous routes cannot fail to heal if treated by a system which insures perfect urine-drainage, as they are not under the influence of conditions which usually prevail in connection with other sinuses occupying different localities.

In an interesting communication, Mr. W. Thomson, of Dublin,* points out that these openings might occasionally be healed advantageously by the aid of a supra-pubic drain. There is one objection to this system of drainage which must be weighed, and it is this: though the supra-pubic opening may be free, and the drain through it apparently perfect, urine will constantly find its way in small quantities, generally under spasmodic influence, into the urethra, and be expelled in this way. I have frequently noted this after all conditions under which the high operation has been performed. When there are perinæal fistulæ, any urine the deep urethra may contain will gravitate into these sinuses, and prevent their repair, just as urine leakages between the sutures in plastic operations on the bladder interfere with healing. Mr. Banks has illustrated † the application of drainage in the treatment of some urinary fistulæ by the ingenious use of a rubber tube passed into the bladder by a puncture through the rectum, as shown in the accompanying figure (Fig. 33); as a rule, however, I think the perinæal mode of drainage will be found more convenient.

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* *British Medical Journal*, Feb. 9, 1889.

† *Edinburgh Medical Journal*, June, 1878.

The fourth variety of urinary fistula I shall notice here is that attended with more or less loss of tissue so as to render it impossible to close the false route by mere approximation of the parts, without sacrificing the dimensions of the urethra. The following illustrates what I mean :—

Case.—A soldier, aged 40, was struck on the perinæum some years ago by a piece of an exploding shell. His urethra was ruptured, a part of the perinæum sloughed, and a urinary fistula was the result. After a time, an excellent surgeon with whom I am acquainted, at the patient's desire, succeeded in closing the fistula by inducing repair by granulation, the patient eventually voiding the whole of his urine again by the urethra. After a trial of his repaired canal for over a year, he came and asked me to give him back his old urinary fistula. He was almost worn out in his contentions with bougies to keep his urethra pervious. His strainings

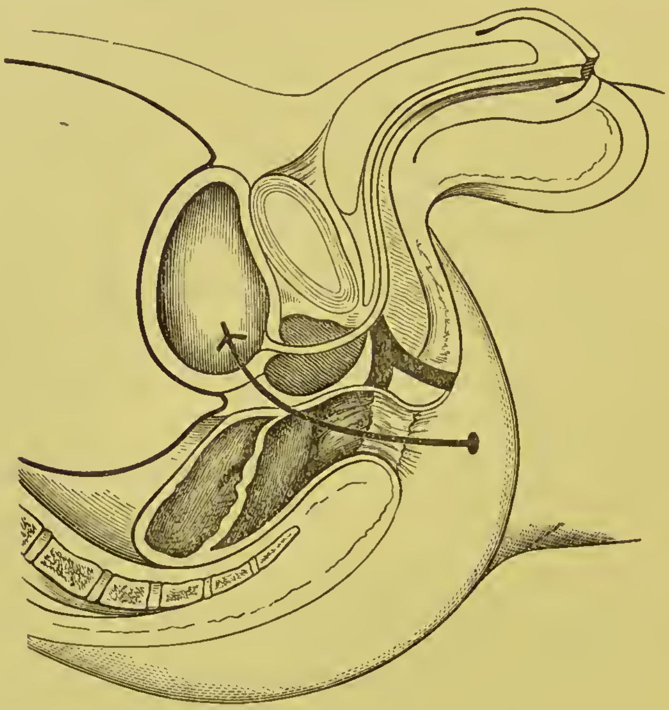

Fig. 33.

to pass urine were considerable; he had frequent attacks of retention of urine and cystitis; and his general as well as sexual condition, with the tight perinæal scar which resulted from his closed urinary fistula, was such that he wished to retrace his steps. Under these circumstances I took him into St. Peter's Hospital, opened his perinæal fistula again for him on a grooved staff, and made him a happy man once more—a state which he continues to enjoy. Beyond some inconvenience naturally arising from his having to pass urine in a sitting position, he has nothing to complain of, and is now quite well.

Urinary fistulæ, arising out of or dependent upon tissue destruction, are found in front of and behind the scrotum, and are usually respectively connected with the penile and deep urethra. The former variety may be illustrated as follows:—

Case.—In 1887 I saw a dock labourer, aged 26, who had been caught by a cotton-hook and the under surface of his penis torn. Some sloughing followed, and a urinary fistula opening directly through the floor of the penile urethra, about an inch in front of the scrotum, was the result. The hole was nearly as large as a threepenny-piece, and a catheter passed along the urethra could be seen and felt through it. On three occasions I tried various plans involving plastic operations, such as those illustrated in text-books, where, by a sort of folding-door arrangement of tissue, taken from the adjacent parts, and brought together by sutures, the breach was covered in, but all to no purpose. Whether a catheter was retained or not during the process of attempted repair, the result was the same, and union failed. On the fourth occasion, having closed in the opening completely by flaps taken from the adjacent parts and brought together by fine wire sutures, and at the same time being satisfied the full calibre of the urethra was not restricted, I punctured the membranous urethra behind the scrotum in the manner described in my eighth lecture, and put into the bladder a full-sized gum-elastic drainage-tube. It was of such a size as to render it almost impossible for any urine to approach the place where the fistula had been closed in. The latter healed soundly by first intention, the drainage-tube was removed on the eighth day, and the perinæal puncture closed n a few days afterwards, the whole of the urine being voided in a natural manner. Neither recurrence of the fistula nor tendency to contraction of the urethra was subsequently observed.

The following also illustrates the same principle, but in a somewhat different way :—

Case.—A boy, aged 12, was admitted into the Liverpool Infirmary, with a fistula at the angle where the penis and scrotum join ; it had followed the retention of a metallic catheter in the bladder for partial rupture of the urethra. Various experiments were tried to close the fistula, but without avail. There being little or no contraction of the urethra, I passed a grooved staff and performed the median operation, as if for stone. I then pared the edges of the fistula and closed it with wire sutures. The effect of introducing my finger into the bladder through the perinæal incision was so to dilate the prostatic urethra as to cause the urine, for some days, to pass incontinently by the wound. During the interval the fistula healed, and within a fortnight from the operation the perinæal opening also closed, and the patient left the Infirmary with his urethra sound and able to micturate normally. No drainage-tube was used.

In the second variety, where the fistula consists of an opening with loss of tissue in the perinæum communicating directly with the deep urethra, the difficulties attending the situation are considerable, as incidentally illustrated in an earlier part of this lecture. Fortunately, instances of this kind are somewhat uncommon. An example of what may here be done has been recently given by Dr. E. L. Keyes, in connection with the operation of excising strictures under circumstances presenting a resemblance to the kind of urinary fistula now under notice. The following details may be added to the reference previously made (p. 58) to this case :—

"A piece of the inner layer of the prepuce, one and a half by two inches, was rapidly cut away and cleaned, placed for a moment in a warm boric acid solution, and rapidly sutured into place in the roof of the gap left by the excised stricture. Four points of catgut were used to attach it to the healthy urethral mucous membrane anteriorly; no sutures were placed posteriorly, as it was impossible to readily reach the prostatic urethral end, so far had the excision gone. Several lateral points of catgut were also applied. A large drainage-tube was placed in the bladder and brought out through the perinæal incision, and the parts were packed antiseptically. Recovery was uninterrupted. Small threads of whitish epithelium were shed off from time to time, but no portion of the substance of the graft was lost. The wound was closed in five weeks. Fourteen months after the operation the patient was reported well, passing a No. 21 (F.) for himself, but showing a slight contraction at the point of imperfect junction of the graft with the healthy urethra."

If in cases of this nature repair is found impossible by transplantation of tissue, as illustrated in principle by Dr. Keyes' case, or by granulation and approximation, it must not be forgotten that the presence of such a fistula does not necessarily interfere with the health of the individual who may happen to suffer in this way. Beyond having to void urine in a sitting position, I have met with several persons who cannot be said to be in any way further inconvenienced, either in health or comfort. The power of retaining and expelling urine is also not necessarily interfered with.

So far, I have referred to such varieties of urinary fistulæ connected with the urethra which, though presenting certain distinctions, all admit the passage of an instrument, such as a catheter or bougie, along the urethra into the bladder. I will now proceed to notice those where the latter condition, after fair trial, is found impossible. Urinary fistulæ associated with strictures which are impassable to instruments, are of two kinds: (1) Those where some urine is voided by the urethra in addition to the amount that escapes by the fistula, and (2) those where the urethra is structurally obliterated, and is pervious neither to urine nor instruments, the whole of the former escaping by the false routes.

In the first class, the principles of treatment are the same as those laid down in the ninth lecture in connection with the subject of impassable urethral strictures. Until the stricture is satisfactorily treated, it is impossible to expect the fistula complicating it to close; but when this object has been attained, then the opening or openings may be treated on the lines laid down in the earlier part of this lecture.

Proceeding now to the second class of cases. Here the stricture accompanying a urinary fistula is not only closed against both urine and a catheter, but the urethra ceases to exist as a canal in some portion of its course. For these, two plans are open: (1) Either to restore the urethra in its continuity and then to deal with the fistula, or (2) in case this is impracticable, and the fistulæ are by reason of their number or position a source of constant annoyance and ill-health, to substitute for them an opening which is not attended with such inconveniencies. This has frequently been done with great and permanent advantage. Some details and illustrations will now be brought forward :—

Case.—A man aged 24, in good health, was sent to me with a central perinæal fistula, the result of a median operation for stone performed two years previously. He both ejected his semen and micturated through the opening. A bougie passed along the penile urethra came to a stop about half an inch, as far as I could calculate, from the line of another passed by the perinæal fistula into the bladder. The canal, I concluded, was closed for about half an inch anterior to the connection with the false route. Here, then, was a case where the parts were healthy, and the patient anxious that the passage should be restored. My course of procedure was as follows, after the patient had been etherised. By the perinæal opening, and into the bladder, I passed a Key's lithotomy staff (straight). Turning it so as to put the groove uppermost, I then passed a metallic bougie (No. 1, English) along the penile urethra down towards the obstructed portion. Cautiously pressing the end of the latter instrument through the obliterated canal, I made my way into the large groove in the straight staff; guided by the latter, the bougie was easily made to enter the bladder. In like manner, Nos. 2, 3, and 4 metallic bougies were then passed. Further proceedings were postponed for a few days, when the process was again repeated, with the result that, instead of a No. 4 metallic bougie, a Maisonneuve's urethrotome was substituted, with which I divided the floor of the obstruction. A Gross dilator was then passed, with which I divulsed the incision, and satisfied myself that all obstruction had been removed. In proof of this, a full-sized catheter could be passed along the whole of the urethra, from the external meatus into the bladder. A drainage-tube was put into the bladder from the perinæum, through which all the urine was discharged. Each day this was withdrawn and a full-sized bougie passed the whole length of the urethra. In three weeks the drainage-tube was removed, and in six the fistula was closed, the patient urinating naturally. When last heard of he was quite well, but still continued the use of the bougie.

There is a modification of this proceeding which I have also practised with success in a somewhat similar case, but where the scar tissue which occluded the distal urethra was much tougher. Having, as in the previous instance, made my way into the bladder, along the urethra, and utilised a Key's straight staff, passed into the bladder from the perinæum, as a guide, I substituted, for a plain metal bougie, a small staff with a central groove on the convexity, such as we use for median lithotomy. Upon this I performed a perinæal section. Having by this plan thrown the two portions of the urethra into one unstrictured canal, the future management of the case was conducted in the same way as the preceding one.

The next case is introduced for the purpose of illustrating the course that is open where, with a stricture impassable both to urine as well as to an instrument, and which is further complicated by numerous fistulæ through which the whole of the urine drains, it is desired to substitute a single median opening directly communicating with the bladder, the object of this being not only to bring about the healing of the sinuses but to serve the purpose of a permanent outlet for the urine. In this instance more was gained than anticipated, as not only did all the false routes close, but eventually the perinæal incision healed and left the patient with a good urethra, through which he was again able to micturate normally.

Case.—T. D., aged 39, a sailor, was admitted into the Infirmary in May, 1879. His history was that of a gonorrhœa nine years previously, subsequent stricture and urinary abscesses, in addition to two injuries to the perinæum resulting from falls. On admission, the scrotum and perinæum were swollen and riddled with nine fistulæ, running in various directions, including one which opened amongst the pubic hairs. The urethra was closed and no urine escaped other than by the fistulæ. I decided to perform perinæal section, and to give the patient one direct channel for his urine. The only difficulty was, that I had to do the operation without a guide, and upon a urethra contracted behind the stricture, by reason of the fistulous openings. However, this was accomplished by keeping the incision in the median line and with the apex of the prostate as a guide. The result was all that I could wish, and the patient made satisfactory progress. At the time of the operation I opened up the occluded distal orifice of the urethra. Later on I passed a fine gum-elastic instrument, and by means of continuous dilatation the calibre of the strictured urethra was brought up to a full-sized. All the fistulæ as well as the operation wound eventually closed, and the patient left the Infirmary able to micturate naturally. I am indebted to my former dresser, Dr. R. P. Sykes, for the notes of this case.

I have seen a case, originally one of stricture, impassable either by urine or an instrument, and complicated with numerous leaking urinary fistulæ, where the bladder was opened above the pubes, and a central route through the perinæum formed for the urine by making an opening on a bougie passed from within outwards and caused to project in this position, as referred to in my fourth lecture.

Instances will occasionally be met with where urinary fistulæ become epitheliomatous. The openings usually present a worm-eaten appearance, are indurated and warty, and no kind of treatment, as far as I know, does them any permanent good. I have scraped and cauterised them, and used various applications independent of the treatment the stricture required, but I cannot say that any advantage followed these measures; the fistulæ have gone on from bad to worse, and the end has merely proved a matter of time. Prevention is better than cure. Many cases of the kind I am now referring to are instances where ordinary sores have been converted into cancerous ones by the presence of a continuing source of irritation in a fertile soil. We see it almost everywhere: in the skin, the lip, the scrotum, the penis, and the uterus will be found examples of this kind of sore degeneration. Many a cancerous ulcer might be averted by the recognition of the surgical principle which demands the early cure or removal of anything that promises to be a continuous irritant to the part in which it occurs.

There is a form of urethral fistula which was first described by Reliquet * under the name of non-urinary fistula. They are to be met with about the orifice of the male urethra. Some years ago I was seeing fairly constantly a patient whom we supposed was suffering from an extremely obstinate though slight attack of gonorrhœa. Everything was tried, including bougies, pessaries, and innumerable injections, but all without avail; the only person who seemed to have any doubt about the diagnosis was the patient himself, who was at his wits' end to explain how he had ever contracted such a disease. One day, when examining him very carefully, I noticed that the little discharge about the meatus which was the source of all our trouble did not come from the canal at all, but from an extremely minute opening by the side of the meatus. Into this a bristle was passed for two or three inches, with the expectation that it would enter the larger passage, but this it did not do, proving itself to have an independent existence. On the

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* "Fistules urétrales non urinaires," *Gazette des hôpitaux*, 1885.

next day we passed a fine probe, used for the puncta of the eye, and this likewise entered to a considerable depth. The mystery was solved, my patient's character was cleared, and in the course of time, by introducing the fine probe occasionally, the sinus closed without further annoyance. In fact, the only trouble at any time was the sort of deception the disease practised upon us, and the belief that the patient was suffering from gonorrhœa. I have seen this since on several occasions, and connect it with a suppuration either of a mucous follicle, or, as Reliquet suggests, of a Cowper's gland. Though surprised at the depth these sinuses travel, I have never been able, even with a fine bougie, to trace any connection with the urethra, notwithstanding they run parallel with it. I have thought of enlarging the openings of these fistulæ with a fine-pointed knife, but the progress of my cases has so far proved this to be unnecessary. They are more alarming in the suspicion they create, otherwise they would not be deemed worthy of much attention. Reliquet has succeeded in demonstrating, by injecting them with water, that these fistulæ may communicate with the deep urethra.

Before closing my remarks on urinary fistulæ, I will refer to some instances where, by extension of the ulceration which sometimes goes on, serious hæmorrhage was provoked.

Case.—E. A., aged 48, was admitted in April, 1885. When twelve years old he had retention and extravasation of urine. Since then he has never been free from stricture and fistulæ in various directions, including the scrotum, perinæum, and pubes. A large quantity of urine was passed through these openings and some by the urethra. On May 2nd I stretched his stricture, under ether, until I could pass a full-sized grooved staff, and then performed perinæal section, so as to have one opening instead of a dozen tortuous fistulæ communicating with the urethra, and put a drainage-tube into the bladder. There was no difficulty or hæmorrhage in performing the operation. A week afterwards he had a sudden attack of bleeding, which continued in spite of tampons and hæmostatics, and recurred on seven occasions. I was about to open up the wound and perinæum in search of the bleeding spot, when my house-surgeon, Dr. Bristow, found that the bleeding came along one of the old disused fistulæ and was from the pudic artery, as it lay under cover of the pubic arch. Doubtless the fistula, no longer sluiced with urine from the urethra, had ulcerated and opened into the artery in this position. The discovery of the source of the hæmorrhage, in the first place, led to a more precise plugging of the wound, with lint dipped in turpentine, so as to exercise pressure on the bleeding vessel, and further suggested what I should do in case the bleeding returned, as the patient was not in a condition to bear the repetition of such attacks. I had planned to open up the sinus which passed beneath the pubic arch directly to the artery, to expose the bone surface of the arch, and then to remove a portion of it with a trephine; this would have enabled me to reach the vessel and ligature it. We had previously found that we could command the bleeding by introducing the index finger underneath the arch, where the pulsation of the artery was distinctly felt. I decided upon this in preference to attempting to ligature the artery as it crossed the spine of the ischium. The last plugging being a precise one was sufficient. We had no return of hæmorrhage, and the patient made a good recovery. When last seen, some months after the operation, he had returned to his occupation as a clerk, with his wound and fistulæ healed, and passing urine naturally.

Dr. F. S. Dennis, of New York, has recorded a case* where severe hæmorrhage took place, under somewhat similar circumstances, from a sloughing wound in the perinæum following some time after a rupture of the deep urethra from an injury. The bleeding was so serious and uncontrollable that Dr. Dennis tied the external pudic artery as it crossed the spine of the ischium with success. Apart from other points of interest connected with the case, he remarks: "This is the only instance I can find where the artery has been tied outside the pelvis for the arrest of hæmorrhage from the branches of the internal pudic artery in the perinæum."

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* *New York Medical Journal*, Nov. 28, 1891.

FOURTEENTH LECTURE.

Foreign Bodies in the Urethra and Bladder.

By accident or design foreign bodies occasionally become lodged within the urethra or the bladder. Amongst the miscellaneous articles that have been found in these positions I can recall to mind pins, needles, wires, a lucifer match, a knitting-needle, a slate pencil, a feather, a bulb-headed grass, pieces of catheters and bougies, a whole bougie, and a pencil-case, but, taking the experience of others, this list might be considerably extended. Most of these things have been introduced for the purpose of acting upon the penile portion of the urethra—for reasons best known to the patients themselves—and have subsequently made their way into the bladder. In reference to the movements of foreign bodies, my impression is that the vermicular action of the urethra is an ejaculatory one, and that such a body is only forced towards the bladder when in its form it presents an obstacle to its outward passage. If this were not so, renal calculi would experience more difficulty in escaping along the canal. A piece of bougie, with its anterior extremity broken and uneven, and its posterior end smooth, placed in the urethra, is sure by the vermicular action of the canal to be forced in a direction towards the bladder by the efforts that are made to expel it.

I will narrate some cases where foreign bodies have been passed into the urethra, as serving to illustrate certain points in practice.

Case.—In 1861, I saw a youth, aged 16, who was suffering from some induration in the ischio-rectal fossa and perinæum. On inquiring into his history, it was found that eighteen months previously the patient had passed into his urethra a needle, which, having slipped from his grasp, disappeared. Not liking to mention it, he refrained from seeking surgical advice. He appears to have suffered very little inconvenience from his accident up to within a week of his being seen, when he had pain about the perinæum and difficulty in micturition. As fluctuation could be felt in the ischio-rectal fossa, an incision was made, and some matter evacuated, but no needle could be felt. Mr. Stubbs then introduced his finger into the rectum, where he could feel the sharp point above. He incised the perinæum in the median line, and removed the needle represented in Fig. 34, which was more than half covered with a deposit of lithic acid. The patient recovered rapidly, and the opening closed, no urine escaping through it.

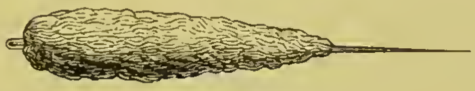

Fig. 34.

The needle appears to have been introduced blunt end foremost, and so to have made its way into the bladder, where it became coated with calculous deposit. Escaping from this position it lodged in the perinæum, and was extracted in the manner described. It is interesting to observe the incrustation of stone upon it, as being one of the ways in which a calculus is formed.* We have had numerous instances of this. In a case where I performed lithotomy, the nucleus proved to be a piece of bone. Mr. Wilkes,† of the Salisbury Infirmary, records an instance of the same nature.

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[*] In the Museum of the Royal College of Surgeons is a calculus (A 126) from the human bladder, having a slender piece of steel for a nucleus. In reference to the specimen the catalogue contains the following note:—"The deposit of uric acid, or any other substance except the earthy phosphates, upon foreign bodies in the bladder is exceedingly rare."

[†] *Proceedings Royal Med.-Chir. Society*, Part 45.

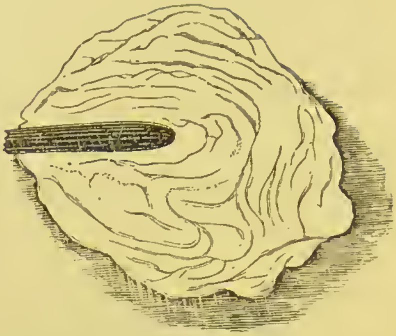

Fig. 35.

Fig. 35 represents a phosphatic calculus, from the Museum of the Liverpool School of Medicine, the nucleus of which is a piece of metal.

Mr. Banks gave me the particulars of a case he had seen where a needle had been passed up the urethra by a boy three days previously. On examining by the rectum he could feel the blunt end of the foreign body, and was able to force the point through the perinæum, and thus to extract it.

The next specimen is a needle, armed with a knob of sealing-wax, which was passed into the urethra, for some imaginary complaint, by a young gentleman, and ultimately made its way into the bladder. After remaining there for some twenty-four hours, it appears to have been forced out into the perinæum, whence it was removed through an incision. The sketch (Fig. 36) represents its actual size, from which it will be seen that it measures nearly three and a half inches in length.

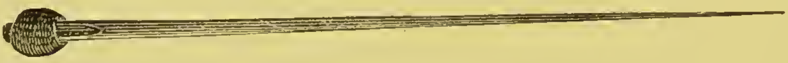

Fig. 36.

Case.—In 1865, Mr. Stubbs, at the Liverpool Royal Infirmary, removed a urinary calculus from the bladder, the nucleus of which was a piece of bougie about one inch in length. The man was suffering from stricture, for the relief of which perinæal section was performed. On an instrument being passed into the bladder a stone was felt, and removed through the perinæal wound. The patient had been in the habit of introducing a bougie, and remembered, three months previously, a piece breaking off, but as no untoward symptom resulted, he thought nothing further of it.

In another case I removed from the bladder of a middle-aged man a No. 3 bougie, twelve inches in length.

Case.—The bougie had been introduced by a surgeon as a guide to a urethrotome, with which it was intended to divide a stricture by internal section. Unfortunately the bougie separated from the urethrotome just beyond the point where it was attached by means of a screw. The surgeon at once divulsed the stricture by Holt's method, and left the bougie in the bladder for extraction on a future occasion. I saw the case fourteen days after the accident. As the urethra would by this time admit a No. 12 bougie, I had no difficulty in introducing the lithotrite and extracting the bougie, which I seized about the centre and brought out doubled; it being soft and of small size, the removal was accomplished by merely gentle traction. The patient recovered without a bad symptom. The bougie appears to have remained curled up in the bladder; no calculous deposit was observed upon it, although it had been retained for a fortnight.

This case points to the necessity of care being exercised in properly securing the connecting links between the urethrotome and the guide. Additional means of security have, I understand, been taken in the construction of the kind of instrument used on this occasion, to obviate the occurrence of such an accident as I have described, which might have given rise to much more serious consequences. Mr. Lund records a similar case, where he removed a bougie from the bladder by the lithotrite. In this instance, also, it was complicated with stricture, for which Holt's operation was performed previously.* An interesting case, where a piece of bougie remained in the bladder for five years, and was successfully removed, encrusted with phosphates, by lithotomy, is recorded by Mr. J. W. Baker.† Dr. Abbe ‡ reports a case where he extracted a whole catheter (No. 10, E.), having previously denuded it of phosphates with the lithotrite. It is possible that the extraction of such a long body might be facilitated by first dividing it with Caudemont's cutting lithotrite, and extracting it in portions.

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* *Liverpool and Manchester Medical and Surgical Reports*, vol., 1873.

† *British Medical Journal*, Dec. 5, 1874.

‡ *New York Medical Record*, Dec. 4, 1881.

Amongst the more remarkable objects that have found their way into the bladder is a bulbous grass.

Case.—A middle-aged man came into the Liverpool Infirmary in 1865, under the care of Mr. Long. The patient supposed that he was suffering from stricture, to remedy which he was in the habit of passing different materials into his urethra. On this occasion he selected the ear and stalk of one of the grasses, which was introduced readily enough, but could not be withdrawn. Further efforts on his part only made matters worse, the ear being forced from the urethra into the bladder. When admitted into the Infirmary, shortly after the accident, he was suffering from most acute cystitis. A lithotrite removed a portion of the grass-head, slightly encrusted with

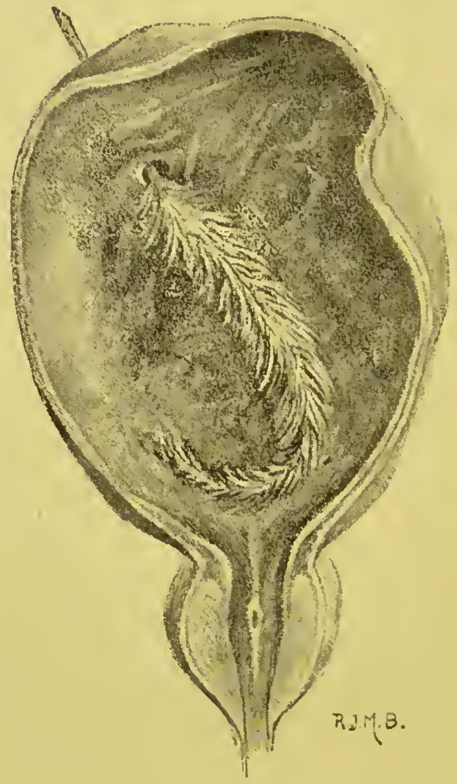

Fig. 37.

phosphates. The symptoms, however, were not abated, and death resulted. On opening the abdomen general peritonitis was found, the viscera being either adherent or coated with a layer of lymph, besides four or five pints of turbid serum, which exhaled an ammoniacal odour. The bladder contained (Fig. 37) a head of one of the grasses, covered with phosphatic deposit.* The stalk, which was stiff and resisting, had made its way through the fundus of the bladder, and protruded into the peritonæal cavity. The pelvic cellular tissue was infiltrated with purulent matter, having a urinous odour. The inflammation extended up the ureters to the kidneys. The history of the case was not obtained without difficulty, and what had actually been inserted into the urethra was a matter for speculation, which the introduction of the lithotrite only incompletely determined.

A somewhat similar case is recorded, in which Mr. Heath, of Manchester, removed by lithotomy about three inches of the stem of a sage-plant, with a thick coating of triple phosphate at the distal end.†

The following case, analogous with the preceding, illustrates the value of the electric cystoscope where foreign bodies of a soft nature are passed into the bladder, and cannot be felt with any instrument:—

Case.—A middle-aged man applied at St. Peter's Hospital, in 1892, and stated that he had put a piece of grass up his urethra a week previously, and believed it was now lodged in his bladder. I passed a sound, but feeling nothing, endeavoured to withdraw the foreign body through a large evacuating catheter by suction with an aspirator, without avail. It then occurred to me to use the cystoscope, and Mr. Hurry Fenwick, who was present, passed it at my request. By means of this instrument those who were with me were able to see a branched piece of grass lying on the right base of the bladder. It was then an easy matter for me to seize and extract it with the lithotrite. The patient left the hospital on the following day, none the worse for his escapade.

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* What I have described as a "grass-head," Dr. W. Carter kindly informs me is the spikelet of the meadow fox-tail grass (*Alopecurus pratensis*).

† *Manchester Medical and Surgical Reports*, vol. ii.

Suction, with a large-eyed evacuating catheter and an aspirator bottle, as used for lithotrity, is an efficient means for extracting some foreign bodies of a yielding nature. I recorded an instance* where a man passed a long piece of bacon rind up his urethra, and some days afterwards a stiff pig's bristle several inches in length. Symptoms of bladder irritation supervening, I adopted this method, and feeling something engaged in the eye of the catheter, after a few movements of the water in the syringe, I withdrew it, as well as the bristle which the catheter contained. Nothing was seen of the bacon, which was either dissolved or expelled, as after what was done all further symptoms of bladder irritation disappeared.

In 1864, a case was related at the Medical Society, by Mr. Robert Hamilton, where he had removed from a man's bladder portions of calculus concretion formed on a feather, which had been passed by the patient for the relief of a stricture. Here lithotomy was performed, as, from the nature of the stricture, lithotrity was impossible.

I will now notice a case where a foreign body was removed from the bladder by means of the lithotrite. I am indebted to Dr. I. Holmes for the notes.

Case.—W. O., aged 38, a militiaman, was admitted into the Infirmary on May 22nd, 1877. His statement was to the effect that on the previous night, when under the influence of liquor, a pencil-case had been introduced up his urethra by a prostitute, in whose company, together with others, he had been. He did not appear, however, to have discovered anything amiss until the following morning, when certain uncomfortable sensations in the region of his bladder made him come to the conclusion that the lost pencil must be there. From his manner I was at first inclined to think the man was insane, but on hearing that Mr. McCheane, the surgeon of his regiment, had discovered a foreign body in his bladder, and had sent him to the Infirmary, I at once examined him. Upon doing so with a sound, the foreign body appeared to be lying obliquely, partly in the bladder and partly within the prostatic urethra. I first attempted to remove it by the extractor, described in Reliquet's *Traité des Opérations des Voies Urinaires*, and known as the instrument of Messrs. Robert and Collin, but failing, a lithotrite was passed. By this the pencil was carried on completely within the bladder, where it was seized transversely. In this position it was impossible to extract it; however, by gradually rotating the lithotrite towards one side, whilst the pencil was within the blades of the instrument, I succeeded in reaching one end, when the pencil was removed, point foremost, without any further difficulty or damage to the urethra. The exact size of the pencil-case is represented in Fig. 38. The patient soon passed urine naturally, and on the following day appeared in no respect the worse for what had been done.

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* *Lancet*, Oct. 29, 1887.

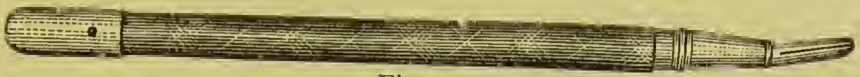
Fig. 38.

The difficulty in removing foreign bodies from the bladder, such as pieces of bougie, is due to their being seized transversely by forceps or the lithotrite. This difficulty Messrs. Robert and Collin have endeavoured to overcome by the use of an instrument something like a lithotrite (Fig. 39), the blades of which are so arranged that, on seizing a body, such as a piece of bougie, it is rotated, and its long axis made to correspond with the course of the urethra. The bladder should be partly distended with water before the extractor is introduced.

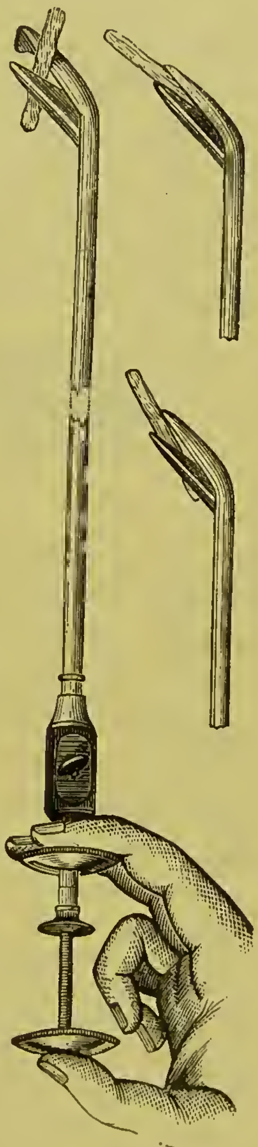
Fig. 39

Perhaps more remarkable than the case of the pencil-case, just recorded, is one where I removed by cystotomy the whalebone mouthpiece of a tobacco-pipe (Fig. 40), encrusted with phosphates. As to how the foreign body got into the bladder the patient must speak for himself.

CASE.—R. H., aged 33, a seaman, was admitted into the Liverpool Royal Infirmary on June 23rd, 1884, suffering from symptoms of vesical irritation. The history elicited the following points :—Eight years previously he had suffered from gonorrhœa. In December last he had some scalding after micturition, and in the same month he was admitted into a hospital in Wales with a fractured leg. Whilst there he appears to have suffered from vesical irritation, and passed two pieces of stone; his symptoms continued on his return home. On admission into the Infirmary I found him suffering from stone in the bladder. Upon examining the calculus with the lithotrite it proved to be large, soft, and peculiarly shaped. The last-mentioned circumstance determined me to cut instead of crushing. On June 27th I performed lateral lithotomy, and removed a large phosphatic calculus, which broke under the grasp of the forceps and disclosed the whalebone mouthpiece of a tobacco-pipe, to which a small piece of rotten string was attached. It was noticed that the smell of tobacco in the mouthpiece was quite distinct. As the phosphatic envelope crumbled under the pressure of extraction, it was impossible to estimate correctly its weight. It must have been very large. About an ounce of these fragments was collected and weighed. The mouthpiece is shown in the drawing. The patient made a good recovery, and left the Infirmary on July 28th. On the fourth day after the operation I showed him the foreign body, and asked whether he could offer any explanation as to how it got into his bladder. He remarked that "he was glad to see it again. He had swallowed it whilst larking with some companions on board ship three years ago. He felt no pain at the time,

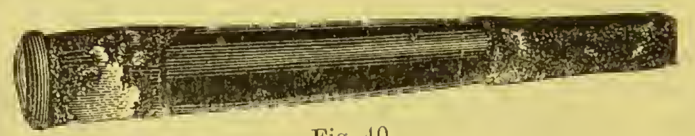

Fig. 40.

nor until last December, when the symptoms of something wrong with his bladder showed themselves." He was frequently spoken to in reference to the improbability of such an explanation, but he would never admit of any other construction being placed on the word "swallowed" than that usually adopted.

In this latter statement will be found the first point of interest. Though so improbable was it possible? In this respect it is analogous with Sir Alfred Roberts' case referred to further on. An instance such as this also shows the difficult position a surgeon may find himself in at the commencement of what he concludes is a suitable case for a crushing operation. Here I had no history except the ordinary one of a stone case to guide me; the calculus was soft, and, though large, was not in my judgment beyond the reach of litholapaxy. In handling the mass as it lay in the bladder with my lithotrite, as I invariably do before proceeding to break, I became aware that I had an unusual shaped body to deal with, unlike any stone I had ever felt. This determined me to cut. If I had pursued my original idea I should probably have discovered my error in time to rectify it; but if I had persevered in my attempts to crush, I might have done irreparable damage to the bladder, and spoiled the chances of my patient's recovery. The case is an important one as indicating a source of fallacy and of danger in some cases of crushing we undertake.

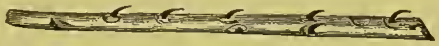

Fig. 41.

A case is published,* where a piece of stick covered with prickles (Fig. 41) was introduced up the urethra of a male in such a way as to render it impossible to draw it out without subjecting the canal to laceration. I quote the following from the record by Dr. G. A. Harris :—

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* *British Medical Journal*, Feb. 19, 1887.

"It transpired on inquiry that three brothers, not quite approving of the attention paid by my patient to one of their female relatives, took counsel together, and waylaying him in the jungle at night, overpowered him, and deliberately introduced two and a half inches of thorny cane into his urethra, well knowing from the disposition of the thorns on the stem that it would be extremely difficult, if not impossible, for the victim himself to remove it, and that, in any case, extreme suffering would result; a powerful moral hint being at the same time inculcated in a way that would ensure its being remembered through life. I gently pushed the stick back until I judged all the thorns had become disentangled, and, with some little trouble, succeeded in passing a cannula over it, as recommended by Mr. Christopher Heath, and withdrew the piece of stick easily through the cannula."

In the majority of instances the history and circumstances connected with the introduction of foreign bodies into the bladder are vague, and the practitioner has often little to guide him in the treatment of the acute symptoms of cystitis, and subsequently of peritonitis, which supervene. In the example recorded and figured (Fig. 37), where a grass-head was passed into the bladder and caused death by perforation and peritonitis, nothing would have saved the patient, even had it been possible to make a full diagnosis, in the absence of a correct history, at the time he was admitted into the Infirmary, but a supra-pubic cystotomy with closure of the perforation into the abdomen by sutures, as is now done in the case of a ruptured bladder. The study of cases and pathological records where foreign bodies have been introduced into the bladder, both in males and females, indicates that in many not only was their removal by operation imperative, but that the method selected should have been of such a nature as to permit the inspection and exploration of the whole of the interior of the viscus, with the view of ascertaining whether such damage was occasioned by the pressure of the foreign body as to render a perforation imminent. If this were the case in a given instance, a laparotomy must necessarily supervene upon a cystotomy. The high operation would alone permit of our applying such an examination and treatment to the bladder if perforated or on the verge of it, as we should to the intestine if similarly involved. Instances will be found recorded where, though foreign bodies were removed by perinæal cystotomy, the patients eventually died of perforation and peritonitis.

Where there exist reasons for believing that a foreign body of some size or irregular shape, more or less covered with phosphates, is contained within the bladder, and may possibly be on the verge of penetrating it, as has happened, it is better to proceed with a supra-pubic cystotomy for the purpose of effecting its removal in what appears to be the safest as well as the most complete manner. Dr. Gillon * reports a case where he removed successfully a phosphatic calculus weighing nearly three ounces, including the nucleus, which was a bone penholder over five inches in length, by a supra-pubic cystotomy. The body was lying obliquely across the bladder, and to extract it, it was necessary to divide the penholder with a pair of bone forceps. Any other method of effecting extraction would probably have resulted in a rupture of the bladder and the death of the patient, who was an artisan, aged 43.

Amongst the more remarkable instances where foreign bodies have been introduced into the bladder and have perforated it, is one recorded conjointly by Dr. Benham and Mr. Greig Smith,† where the end of an iron umbrella rib was found in contact with the intestines. The specimen, as shown in the drawing (Fig. 42), was discovered after death in the body of a demented male epileptic. It is remarked :—

> "In this case the foreign body passed through the bladder into the peritonæal cavity for a distance of two inches, apparently without doing any harm. Phosphatic deposit was laid down on the metal in

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* *British Medical Journal*, July 30, 1887.

† *Bristol Medico-Chirurgical Journal*, March, 1886.

slight amount for half an inch outside the bladder, and this suggests that the walls of the bladder, as it filled and emptied, slipped up and down the instrument, giving opportunity of only intermittent incrustation. It is nothing short of marvellous that no escape of urine into the peritonæum should have taken place."

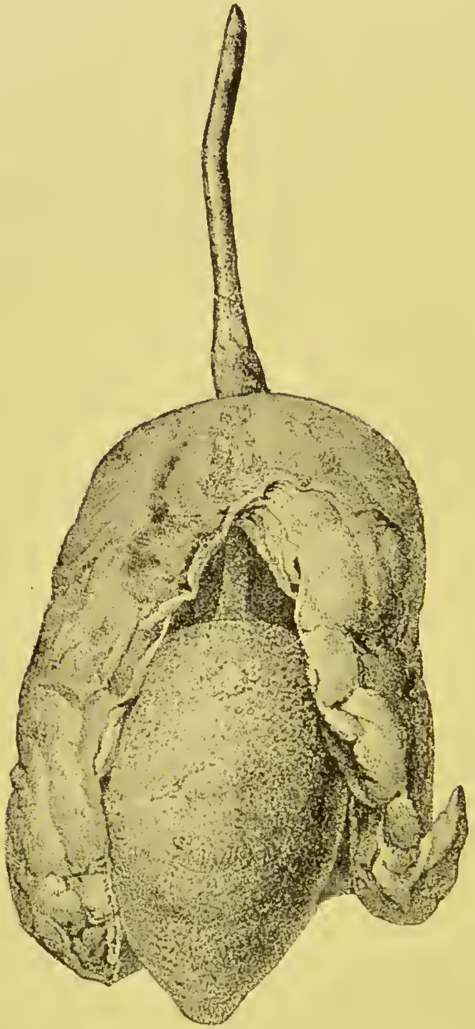

Fig. 42.

Dr. Poulet[*] seems to conclude that such cases of perforation are necessarily and speedily fatal.

The publication of the case of the tobacco-pipe[†] led to my receiving several interesting letters from practitioners throughout the country in reference to the difficulty of diagnosis in cases of this nature. Amongst these letters was one from Mr. J. H. Wilson, of Thetford, who refers to a case successfully operated on by Mr. Cadge by lithotrity, where the nucleus of the phosphatic mass in the bladder turned out to be a boot-lace. Having anticipated that he had to deal with a foreign body, Mr. Cadge writes: "My suspicions turned out to be correct, for I have removed, at four or five sittings, with the lithotrite, six or seven inches of a black thin thing which I believe to be a common boot-lace, covered with phosphates. Even with this evidence, the fellow will not admit to having introduced it, or allowed anyone else to do so." Mr. Wilson adds: "Like your patient, mine remembered, after a stretch of memory, having swallowed a bootlace." These cases are of value, as I said before, as illustrating difficulties in diagnosis which, without such examples, we might hardly expect to meet. If patients will not tell us, or do not of themselves know that they have pencil-cases and pipe-stems in their bladders, we cannot always be expected to enlighten them at once upon this point.

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[*] *Traité des Corps etrangers en Chirurgie*, Paris, 1879.

[†] *Lancet*, Feb. 14, 1885.

In using the lithotrite for the removal of phosphatic calculi formed on a foreign body, it must not be forgotten that the latter is sometimes of such a nature as actually to entangle the jaws of the lithotrite and to impact them. This has happened with a hair-pin, and the noose of a wire suture, which found their way into the bladder and formed the nuclei for stones. Mr. E. E. Dorr records a case* where a man had passed up his urethra a piece of chewing gum, which, in three months, became largely coated with phosphates. It was successfully removed by the supra-pubic method. It is noted: "It would have been impossible either to have crushed the gum, which was still soft and sticky, or to have disengaged the jaws of the lithotrite." Two instances have recently been recorded where paraffin was injected into the urethra, and subsequently concreted in the bladder. One occurred in the practice of Mr. David Wallace,* and the other of Mr. Buckston Browne.† We are reminded that an article of this nature floats on the urine or upon any fluid the bladder may contain.

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* *British Medical Journal* (Epitome), May 14, 1892.

Mr. H. C. Garde records an instance‡ where a man pushed a threepenny-piece into his urethra, which, in the course of six weeks, worked its way into the bladder. It was successfully extracted by the lithotrite, though, it is stated, "more than half of the coin projected from the side of the instrument."

In connection with the passage of stones from the kidney down the urethra, it has been noticed that their expulsion from the latter canal is often much facilitated by the patient, when feeling that he is about to void one, closing the meatus for a moment on commencing to urinate, so as to obtain the full dilating power of the urine.

Referring to the escape of foreign bodies from the intestines to the bladder, it will be desirable to notice those cases where there can be but little doubt that this has happened. We may put aside, as not bearing upon the subject, those instances of malignant ulceration where the bladder and intestines are thrown into one chasm, and a free interchange of their respective contents takes place. These examples will again come under notice in connection with the subject of malignant ulceration of the bladder and its treatment. Sir Alfred Roberts, of the Sydney Hospital, N.S.W., records one where the patient, forty-seven years of age, had swallowed a piece of slate-pencil two and a quarter inches long, which was subsequently successfully removed from the bladder by lithotomy. Commenting upon this, the author says: "I have left no stone unturned to elucidate the truth in this interesting case, and I can only state that, after much hesitation, I have arrived at the conclusion that the pencil was swallowed by mouth, and made its way by inflammation and ulceration into the bladder."* Dr. Rawdon met with two instances in his practice as surgeon to the Children's Infirmary, where a needle and a sharp piece of wood formed the nuclei for stone removed by lithotomy. In both cases he believed that the foreign bodies had made their way into the bladder from the intestines.

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* *Transactions of the Med.-Chir. Society*, Edinburgh, Dec. 7, 1892.

† *British Medical Journal*, June 30, 1888.

‡ *Australian Medical Gazette*, July, 1888.

A case is recorded by Mr. Brownhill where a woman, aged 26, passed spontaneously by the urethra a stone weighing over half an ounce, the nucleus of which was a hair-pin. Twenty-seven months previously, when straightening her hair with the pin in her mouth, one of her companions pulled her hair behind, causing her to laugh and throw her head back, when the pin slipped down the œsophagus. It was considered probable that the pin passed from the sigmoid flexure of the colon into the left side of the bladder.†

Passing to circumstances which arise out of more everyday experiences, the following case presents points of considerable interest:—

Case.—A gentleman, about 50 years of age, was referred to me by Dr. Cameron, in April, 1882, with a note that there was a formation or tumour about the base of the bladder which was palpable to the touch. His history pointed to intestinal irritation of some months standing. For six weeks he had suffered more or less from diarrhœa and irritability of the bladder, accompanied with considerable abdominal pain. His urine contained pus and air bubbles, and he noticed that micturition terminated with a sort of fizzing noise. There was considerable swelling corresponding with the fundus of the bladder. The mass was about as large as a cricket-ball, and felt like a scirrhus. A sound passed into the bladder detected nothing abnormal. The urine was found to contain pus, air globules, and particles of food. About a fortnight after I saw him the patient reported himself as being better; the swelling and irritability of the bladder were both less. The urine at times was coloured with fœcal matter and contained, by the microscope, some elements of food. He stated that he had recently passed with some trouble, by the urethra, a mass about three-quarters of an inch long which he thought was a stone. This proved to be the end of a rabbit's thigh-bone, which no doubt was swallowed, and was the key to the whole case. After this he began to improve, the swelling disappeared, and he rapidly convalesced and resumed his business. He has since enjoyed good health, but at times he is conscious of a little escape of wind into the bladder, and when his bowels are much relaxed there is also some fœcal matter. Probably the fistulous communication has never completely closed.*

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* *Medical Times and Gazette*, July 30, 1859.

† *London Medical Gazette*, October, 1845.

When the case first came under my notice it seemed to present almost every feature usually associated with a malignant abdominal growth. Had I then committed myself to a diagnosis I hardly see how such a conclusion could have been avoided. The progress of the case and the lapse of time, however, indicated that such could hardly have been so, though the age of the patient, the gradual and ill-defined character of the early symptoms, the losing of flesh, and the ulcerous communication between the bladder and intestines, all seemed to point one way until the foreign body was discovered. How greatly the difficulties connected with the case would have been added to, so far as an explanation of the symptoms was concerned, had the bone been allowed to leave the urethra without being recognised!

Dr. Renaud, of Manchester, has kindly communicated to me a somewhat similar case which came under his observation, where, on the death of the patient from other causes, an examination of the parts was made. Dr. Renaud sent me the following extract from his note-book, accompanied with a drawing of the parts involved in the lesion I am now referring to:—

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* *Liverpool Med.-Chir. Journal*, January, 1884.

Mr. ——, aged 63, observed that his urine was surcharged with amorphous lithates for the space of one month, after which he noticed that micturition was frequently interrupted by an escape of air bubbles through the urethra. Feeling sceptical, I asked him to void urine in my presence, and sure enough the sound of air bubbling was unmistakable. Two months later I noticed that the urine was a good deal loaded with mucus, and that some foreign substance was mixed up with it, which when placed under a microscope was found to be a mixture of granular cells, spiral vessels, etc. Nine months after I first saw the patient he died, partly through gout and other causes, of which the symptoms here referred to did not represent an important element. The colon was found adherent to the fundus of the bladder, and some coils of bowel were glued together by old, and in one part thickened adhesion. In this latter a cherry-stone was found lodged in a false diverticulum or puriform sac, which communicated with the colon by another opening. With this evidence before me, I hardly hesitated to conclude that the granular cells noticed five months ago represented a part of disintegrated kernel of cherry-stone swallowed a long time previously.

With illustrations such as these before us, we cannot be surprised at almost anything that may turn up in the course of our examination of the urine. We must not forget in connection with this remark that all sorts of deceptions have been practised by means of the urine. I not only refer to persons, for some extraordinary reasons best known to themselves, endeavouring thus to deceive medical practitioners, but to other instances where deceits of this kind are practised for the purpose of legal fraud. Practitioners cannot be too careful, where the statements are of a suspicious nature, in seeing the urine passed in their presence by the patient. In one case that incidentally came under my notice, I feel sure an attempt was contemplated in a life insurance examination to substitute the urine of another person. There was really no cause for this, but the individual referred to had been victimised by quacks, who had succeeded in extracting a considerable sum of money on the ground that he was passing his semen unnaturally, and I believe he merely felt ashamed of the nature of his alleged complaint. However, the case had its lesson in more ways than one.

The female bladder is frequently found to contain various foreign bodies. Some years ago, by means of a pair of fine dressing forceps, I removed a bodkin, which had been introduced by the patient for the purpose, it was alleged, of extracting a piece of gravel from the urethra.

A case was narrated by Dr. Grimsdale, at the Medical Society in 1865, where he had removed a phosphatic concretion, formed on a large hair-pin, from the bladder of a young lady, aged fifteen years. Removal of the foreign body was effected with forceps, after rapidly dilating the urethra with a Weiss's dilator. On the second day after the operation she was able to pass water voluntarily; recovery followed, the patient possessing full power over the bladder. In this instance there was some tumefaction above and to the left side of the symphysis pubis, as if an abscess were impending. It is probable that the foreign body might have been expelled in this way had not its removal been effected by surgical interference. I would prefer, under similar circumstances, supra-pubic cystotomy to urethral dilatation. The museum of the Liverpool College also contains a hair-pin (E 22), which was removed by Mr. Bickersteth, by rapid dilatation, from the bladder of a female. Hair-pins appear to be rather favourite articles for passing into the female bladder, as I see another case of this kind is recorded by Dr. Johnson.*

Foreign bodies in the rectum sometimes excite considerable irritation in the bladder. In an instance that came under my notice, the lodgment of a fish-bone in the bowel, just within reach of the finger, kept up intense vesical irritability, which disappeared on the removal of the cause. In another case the retention of a small gold plate, with a false tooth, produced similar effects. Scybalæ and hardened fæces may act in the same way, especially when the prostate is large and presses on the bowel. Washing out the rectum thoroughly every morning with a copious enema often proves of the greatest comfort in the latter class of cases.

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* *British Medical Journal*, Sept. 27, 1879.

FIFTEENTH LECTURE.

IRRITABLE BLADDER.

THE term "irritable bladder" has been used to express a disease rather than a symptom, and hence some confusion has arisen in the application of therapeutics to the precise condition upon which it depends. It is as necessary to be cognisant of the circumstances which give rise to this disturbance as it is to know the causes producing a similar symptom in any other organ, such as the eye or the larynx, when one is about to discuss them, with a view to treatment. To prescribe correctly for an irritable bladder, the same analysis of the symptoms is required as is needed in the other illustrations I have taken.

Though by the term we mean that micturition is performed unusually often, we do not attempt to qualify this definition by any statement as to the number of times a healthy person should micturate in the twenty-four hours. There are variations, dependent upon circumstances and individual peculiarities, which would render such an attempt almost ridiculous, and therefore, unless a person was in some manner inconvenienced by the frequency with which the act was performed, I should not hold that he was disordered in this way. This form of disease is usually traceable to one or other of the following conditions: Nerve, habit, reflected action, structural diseases, including tumours and stone, and abnormal states of urine. In a case of the kind, if you will go through these headings systematically, you will probably succeed in making a correct diagnosis.

A certain proportion of cases of irritable bladder are due, not to disease, but to the disturbed nerve tone of the individual. I have known persons in anticipation, for instance, of a long railway journey, go on for days previously micturating every few minutes, in view of an imaginary inconvenience they may be temporarily exposed to, and thus acquire a habit which became established. For some years I was occasionally consulted by an elderly gentleman who suffered in this way; the dread of the fortnightly journey to London for business purposes manifested itself thus until a habit was acquired which threatened the patient's health, and yet there was nothing else to explain it. All sorts of expedients only seemed to add to his distress for fear of their failing, until the introduction of a more rational system of railway carriages, the use of which was followed by a cessation of this symptom.

The strange vagaries one meets with sometimes in connection with disorders of the urinary organs is but to be expected in a system so largely endowed with nerve supply. A patient once presented me with an elaborate table, in which he had noted by his watch the number of seconds he took to perform each act of micturition; these he worked out mathematically, with the ratios of time to quantity of urine, and asked me to explain certain differences which appeared to him very ominous. Yet he was sane, and only asked for information which I endeavoured to supply.

Not unfrequently irritable bladders have been developed in persons who have had any reason, however slight, for believing that they suffer from stricture. I have seen this follow upon all kinds of misapplied constructions relating to normal facts of micturition; upon the unskilful introduction of instruments undertaken with the object of removing such doubts; or even upon a purely imaginary dread of inability to void urine. In addition, however, to that kind of assurance which is the outcome of careful investigation, these cases are often benefited by medicines whose power in toning the nervous system is well recognised. I speak of the preparations of iron, nux vomica, strychnia, and phosphorus. I have sometimes found the bromide of ammonium, in twenty to thirty grain doses in water, three times a day, act almost as a specific in this condition. Of the solution of the dialysed iron I can speak favourably, as strengthening nerve power without disturbing the digestive functions. On the use of aperients, of baths, and of suitable diet, both in eating and drinking, I need not insist, as these are essential in promoting both nerve and physique generally.

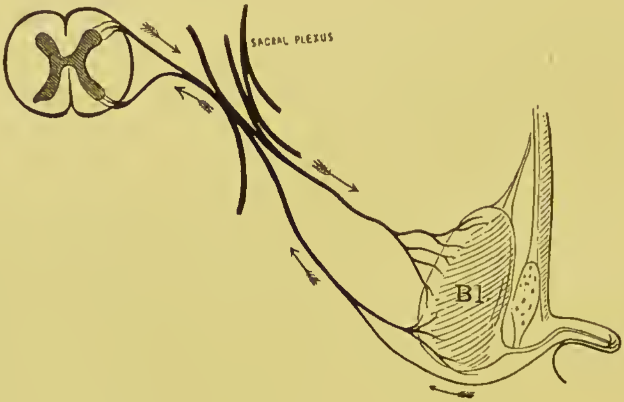

Fig. 43.

Irritability of the bladder, dependent upon reflected action, is more commonly met with in children and young persons. Illustrations of this class are furnished by the irritability that occasionally attends the presence of intestinal worms, and the cutting of a tooth in a child will produce the same effects. In youths, and even in those of a more advanced age, a constant desire to micturate may be kept up by an elongated or adherent prepuce, which, by retaining secretion, causes inflammation. For this the operation of circumcision and separation of adhesions supplies the remedy. How it is that irritability of the bladder is caused by the reflected action which the prepuce sets up, and conversely, why pain is felt at the end of the penis when there is a stone in the bladder, are points which are well illustrated by Mr. Edmund Owen in the accompanying drawing (Fig. 43).* Irritability is a frequent concomitant of structural changes in the urinary organs, growths, and calculous affections, not excluding certain forms and stages of purely renal affections.

Irritation is caused by enlargement of the prostate, particularly at the commencement of the disease. At this stage it would be more correct to speak of it as senile engorgement of the prostatic veins, a condition which often precedes the structural enlargement of the part with which we are familiar. The irritability connected with prostatic engorgement shows itself chiefly at night. The patient is well during the day, but as soon as he gets into bed he experiences a desire to pass water, which further disturbs his rest by provoking other calls after intervals of varying extent; or it may show itself by inducing a state of more or less priapism, which equally interferes with sleep. Provided there is nothing in the state of the urine to account for it, I have known simple expedients efficacious in remedying, if not entirely putting a stop to, this symptom. The wearing of warm socks at night, or the use of a hot bottle to the feet, by determining the blood to the legs, is often found beneficial—a fact which supports the belief that the appearance of this symptom only at night is due to some alteration in the venous condition of the part by reason of the change in position. Opiates are not to be recommended, but I have often found some simple sedative, such as a drachm of tincture of lupuline, of service on going to bed. Similarly, sulphonal is useful. That form of residual urine which so often precedes other physical signs of prostatic hypertrophy is sometimes an overlooked cause of bladder irritability. It will be again referred to.

It is difficult to explain some of the forms of irritability connected with prostatic hypertrophy and sacculation about the neck of the bladder which are so frequently associated with it. I believe, however, that it is more mechanical in its production under these circumstances than is generally believed. In a case I examined after death, the symptoms of sudden irritability appeared to be due (1) to a collection of urine above the prostate, and (2) to the sudden emptying of this collection into the prostatic urethra by a sort of syphon, or spout-like action, as soon as the level of one of the channels permeating the prostate into the urethra had been reached. This could be imitated on the dead subject, and seemed to account for the suddenness with which micturition had to be accomplished, and the impulses that followed changes in the position of the body. Again, in some cases of irritability of the bladder in elderly men on assuming the recumbent position, this symptom is obviously due to the falling backwards of prostatic growths, or their alteration in position relative to the bladder, in the same way that an elongated uvula will provoke coughing on the patient lying down.

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* Harveian Lecture, *British Medical Journal*, Feb. 28, 1880.

There is a condition of incontinence rather than of irritability which elderly persons of both sexes are sometimes annoyed by. I refer to the involuntary escape of drops of urine in connection with such movements as laughing, coughing, and sneezing. It is apt to become chronic. I have found, as Dr. Ringer * first suggested, the tincture of cantharides, in two or three drop doses, three times a day, of much value if steadily persisted in. Eliminated by the urine, it appears to act directly on the sensory nerves and restore the sphincter power. In like manner, the same author observes, cantharides and iron exercise control in cases where seminal emissions are unnatural and hurtful.

Some years ago I described † a pathological condition of

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* *Handbook of Therapeutics.*

† *Liverpool Med.-Chir. Journal*, July, 1882, p. 243.

the neck of the bladder which came under my notice in the *post-mortem* room when examining the body of a male adult who had suffered from urinary irritability. I refer to a crack or fissure, commencing in the prostatic urethra and involving the vesical orifice.

> "Though I noticed its resemblance to other abrasions of a like kind commonly met with in the rectum, the termination of the male and female urethra, and the mouth, I did not then fully appreciate its possible significance. Since then, in practice, I feel sure it has come under my notice chiefly as a cause of irritable bladder. Some patients whose bladders are diligently searched for stone furnish illustrations of this little recognised affection. The symptoms of fissure of the vesical orifice are analogous to those observed elsewhere. There is pain on micturition, and a sensation of contraction and dilatation at the close of the act, accompanied with a sharp stinging sensation behind the scrotum which is significant. Occasionally a few drops of blood escape as micturition terminates. The pain varies in degree in the same patient, being intense when the urine is highly acid, and less so when it is neutral or alkaline. Examination of the prostate by the rectum invariably produces on pressure a sharp sensation as if a knife were piercing the part. Similarly, the passing of a sound into the bladder is distressing. Occasionally these cases are referred to some gouty or rheumatic disorder; by the French the term *contracture du col vésical* often includes them. When this affection is considered to be traceable to either gout or rheumatism, the patient is almost invariably placed on an alkaline treatment with decided advantage, for the reason already mentioned. Spiegelberg * has also illustrated this condition."

Irritability of the bladder in children and adults is a common symptom of stone, though it varies much both in kind and degree. There is this distinction in the irritability connected with stone which has often struck me: in other forms the patient yields to it, with the prospect of a temporary relief; in stone, with the certainty of his suffering being increased. Some time ago I was treating for irritability of bladder a gentleman whom I suspected was suffering from stone. One day I was examining him with a prostatic

* *Principles of Surgery*, by Dr. J. Ashhurst; 3rd edit., Philadelphia, 1883.

catheter, after I had previously, as I thought, emptied the bladder of all the urine it contained, when, in moving the instrument about, I felt it suddenly pass over something, and then, on gently pressing it, it went a couple of inches further in. This was followed by the discharge of two ounces of milky-looking urine. My friend went home, pondering over the suggestion that his irritability was due to a sacculation containing urine, which I had accidentally discovered; at all events, he was relieved, and remained so for forty-eight hours, when the same feeling returned. Having had some experience in catheterising himself he passed his instrument, and having drawn off some urine, he began cautiously to feel about his bladder, with the same result as I had experienced. The patient then came to the conclusion I had already formed—that his bladder was sacculated, and being an ingenious man, he devised a stylet by which he could pass his catheter into the secondary receptacle. When I last saw him, he informed me that by passing an instrument for himself in this way he was cured of this irritability, and he also believed that the sacculation had disappeared.

Stricture of the urethra is not uncommonly attended with some degree of irritability. In the earlier form of stricture this is due to disturbed muscular action, but in the latter forms of the disease it is due to those changes in the walls of the bladder to which reference has been made. It is interesting to note how long the irritable condition of the bladder remains after the stricture has been remedied and the urethra dilated to its natural size, and the time the small thickened bladder takes to adapt itself to the ordinary requirements of micturition. In the majority of individuals it does recover itself, but in others it continues to be irritable even after the obstruction has been relieved. In some instances I have tried to increase the capacity of the bladder by hydrostatic pressure, with, I believe, benefit. The following is an exceptional case of irritability of the bladder continuing after the stricture had been relieved :—

Case.—W. J., aged 49, was readmitted into the Liverpool Infirmary on Feb. 21, 1879, having previously been treated by me for an old-standing stricture with irritability of the bladder. After his stricture had been dilated, I told him it was probable that in the course of time his bladder would adapt itself to the improved state of the urethra, and again become tolerant. The irritability, however, continued, and he was readmitted, when I found his urethra capable of receiving a large bougie, but his bladder was thickened and so contracted that it would not hold an ounce of fluid. His condition of irritability, both by night and day, was as bad as anything of the kind I had ever seen. I therefore resolved to suspend the action of the bladder by median cystotomy, which I did, with Mr. Rushton Parker's assistance, on April 2, 1879. The irritation previously felt by the patient at the end of the penis was so severe as to cause him to scratch his glans until a deep sore was formed, as large as a sixpence, by the side of the meatus. Soon after the operation the sore began to heal, and on April 15th it was noted by my dresser (Mr. Renner) that it was well. The operation was followed by complete relief, the patient, for the first time for many months, and without anodynes, obtaining sound sleep ; in fact, he appeared to be making up lost time, as, in addition to his nights, he spent most of his days in sleep. On April 25th urine began to pass along the urethra, and by the 30th the perinæal wound had healed. The patient left greatly improved ; though passing his urine more frequently than natural, he was free from the spasmodic pains which distressed him so much. I have since heard the improvement continues, and that he can hold his urine for several hours.

I will now notice the irritability due to altered and abnormal states of the urine. The urine least irritating to the urinary passages is that which most nearly approaches a healthy standard. The low specific gravity of the urine that is passed so frequently and abundantly by hysterical females no doubt is connected with the irritability of the bladder from which they almost invariably suffer. The abundance of uric acid in the urine of the gouty undoubtedly explains the irritability of the bladder and feeling of weight these persons experience in the region of the prostate. Gouty manifestations in the parts behind the triangular ligament are almost as frequent as the more familiar indications of this diathesis met with about the ball of the toe. The benefit that attends the administration of gout remedies in these cases, together with diluents, is most marked. A free discharge of uric acid crystals in the urine sometimes explains, as well as gives relief to, an irritable bladder. I have seen patients, undoubtedly gouty, who successively suffer from eczema and irritability of the bladder. Neither is present to any degree at the same time, and the one disorder seems to be the alternative of the other. The drinking of much hard water sometimes causes irritability of the bladder, especially in those persons who, by reason of a large prostate, have a greater area of vesical mucous membrane. It seems as if in some instances the fluid consumed excoriated the bladder almost as it does the hands. A change in the drinking water has, however, often been noticed to remove this symptom.

There is a form of irritability—for so it certainly is, though manifesting itself by actions rather than by sensations which are morbid—where the bladder is not under proper control. I allude to the nocturnal incontinence of young children. This state is not to be mistaken for the dribbling or running over of a distended bladder, which, by atrophy of its muscular coat or other similar cause, is prevented expelling its contents. In the management of these cases, reliance should be placed chiefly upon inculcating habits of regularity in attending to such children, combined with medicinal treatment. Of the drugs in which I have the greatest confidence, I may mention belladonna and its alkaloid atropine.* I have found the wearing of a fresh belladonna plaster on the back or abdomen of service. I am aware that a variety of mechanical means have been adapted for the treatment of this affection, such as jugums or urethral compressors, and closing the meatus with collodion, as suggested by Sir Dominic Corrigan.† Of these I think the latter is the least hurtful, and may occasionally, when other means have failed, be resorted to with advantage. Attention to the diet is very necessary in these cases; irregularities both in eating and drinking are often attended with a condition of urine that is likely to provoke incontinence. A strictly milk diet has in some instances been sufficient to effect a cure. Irritability of the bladder is not unfrequently met with, in highly intelligent and sensitive children, at about the age of ten or eleven years, when they are entering upon the sterner forms of educational study. On examination of the urine it will be found loaded with phosphates. In remedying this condition, bromides in combination with quinine will be found invaluable, whilst at the same time the child should not be submitted to an undue amount of nerve tension by the educational studies.

We have been accustomed to regard frequent micturition as a functional disturbance so far as the bladder is concerned, and for the most part it is; but we must not forget that such contraction may produce changes above which follow as a consequence of urine-pressure—I mean dilatation of the ureters and the pelvis of the kidneys. I have seen this after death where there was nothing to account for it other than the obstacle to the escape of the urine which a frequently contracted bladder presented. By this I mean that the urethra showed no indications of being permanently strictured.

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* I find the following formula useful in these cases:—

℞ Atropiæ, gr. i.
Acid. Acet., gtt. iv.
Alcohol,
Aquæ, āā ʒiv.
M. Four drops before each meal in a wineglassful of water.

† *Dublin Quarterly Journal*, February, 1870.

SIXTEENTH LECTURE.

Hæmaturia.

Hæmaturia, like irritability of the bladder, though only a symptom of disease or injury, is of such frequency and significance in connection with disorders of the genito-urinary apparatus as to require some general consideration apart from those incidental allusions to it which must necessarily be made in other parts of this course. Without setting aside the value of many of the results arising out of clinical observation, and the importance of this method of investigation, it must not be overlooked that during the last few years we have been able to add materially to our resources in diagnosing by the use of the cystoscope with the electric light. This instrument will be again referred to in detail.

Blood in the urine is naturally a prominent symptom, and on its appearance often seems to arouse, for the first time, the attention of the patient, and to cause him to seek professional assistance. It may be unimportant and readily rectified; whilst, on the other hand, it may portend, or be associated with, mischief of the gravest kind. In commenting upon hæmaturia in this general way, it will be as well to look at it in the light that it is usually presented to us. A patient comes to us and says, "I think I pass blood, or what I believe to be blood, in my urine." Such a statement as this leads to the rejoinders, Was it blood? and What are the precise circumstances under which it was passed? We will now proceed briefly to review the forms under which blood may appear in the urine, with some illustrations.

Kidneys.—Blood from the kidneys is, as a rule, intimately mixed with the urine, giving it an appearance of thin porter, or rendering it, as it is termed, smoky. Though occurring in general disorders—as in certain forms of Bright's disease, and in cachectic conditions, such as purpuric scurvy, as well as in fevers—its relation to the kidneys as a symptom is for the most part of surgical significance. We meet with it as the result of severe injuries applied over the region of the kidneys, where some rupture of the organ has been occasioned. A large quantity of blood may be lost in this way. In Dr. Rawdon's case,* which occurred in a child from an injury, the amount was so excessive as to cause the bladder to become filled with clots. Nephrectomy was eventually resorted to, when the kidney was found almost torn across. Something of the same kind happened in the following instance:—

CASE.—In 1870, in the Liverpool Infirmary, there was a patient who, in addition to a compound fracture of the leg, had sustained an injury to his back by falling from a great height across some scaffolding. He died three weeks afterwards pyæmic, and exhausted from continued hæmaturia. The expediency of cutting down upon the kidney was discussed, but not entertained, by reason of the impossibility of determining which organ was involved. A *post-mortem* examination showed a transverse gash of the right kidney almost dividing the ureter.

Hæmaturia is frequently met with in connection with renal colic and the movement of stones from the kidneys downwards, when there is usually no difficulty in diagnosing the cause of it. The impaction of a calculus within the kidney is also sometimes attended with persistent hæmorrhage, but I have not met with it alone of sufficient extent to require an operation to remove the cause of it, though when combined with other symptoms it has indicated the necessity for nephro-lithotomy, which is now successfully practised. Hæmaturia occurs in early childhood in connection with the growth of tumours of the kidney, the absence of this symptom being explained by the pressure of the growing mass upon the ureter, and its consequent obliteration.

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* *Liverpool Med.-Chir. Journal*, January, 1884.

Hæmaturia in the adult, from sarcoma of the kidney, is often profuse. This cause may be suspected when an enlargement of the kidney is to be felt, as, in some instances of sarcoma, growth and hæmorrhage are the only objective signs. Bleeding under such circumstances is a condition which would indicate aspiration or exploration of the kidney from the lumbar region, and, if the diagnosis is thus confirmed, the extirpation of the organ. I saw in a young man a case of malignant tumour of the kidney which was at intervals attended with profuse hæmaturia, where ligature of the ureter would have saved the patient from much vesical distress, in the absence of other means for arresting hæmorrhage.

Congestion of the kidney will sometimes be relieved by a smart attack of hæmaturia. I have seen this and treated it surgically, in consequence of clots retained in the bladder decomposing and setting up cystitis. One of these patients was subject to these seizures on exposure to cold, and could not empty his bladder by reason of some enlargement of the prostate. In two others, curiously enough, it followed excessive indulgence in asparagus. Hæmorrhage from the kidney sometimes gives rise to severe attacks of vesical colic.

Case.—In 1883, I saw a gentleman, aged 60, suffering from renal hæmaturia, followed by pain over the bladder. After passing blood and clots with the urine he obtained relief. He always knew when he was going to void blood by the sensation of his bladder filling, followed by acute pains over the supra-pubic region until the blood was expelled. Then he would go on fairly well until another attack supervened. He had a slight enlargement of the prostate, but did not otherwise require surgical interference.

When blood thus becomes clotted in the bladder it may be left to escape spontaneously, provided it occasions no symptoms either of colic, retention, or cystitis. If such be the case, then it is best removed with a large-eyed catheter and Clover's suction apparatus. Blood occasionally forms the nucleus of stone in the bladder. I have twice removed phosphatic calculi with friable network centres, which probably represented the remains of previous clots. Mr. Cadge * mentions a case where he extracted a stone weighing two ounces from a man who had twice been in hospital under the care of the physicians. The stone broke in the forceps, and large quantities of black material, like cinders, came away mixed with scales of calculous matter. It was found to be composed of alternate layers of dried blood and phosphates, with a nucleus of oxalate of lime.

I must not omit to mention a form of renal hæmaturia which has come under notice. It was in a case of villous tumour of the bladder, about which there could be no doubt, as a portion of it was removed and submitted to the microscope. After death, the pelvis of one kidney was found filled with a similar growth. Cystoscopic examination as now practised would probably have enabled us not only to see the tumour in the bladder, but also that the urine issuing from one ureter was distinctly coloured.

In the general treatment of hæmaturia, more particularly that connected with the movements of renal calculi, I have frequently found oil of turpentine, in doses of ten to fifteen minims three times a day, in capsules, of much service. The same may be said of ergot and matico. Professor Gairdner, of Glasgow, writing to me, remarks: "In one or two of the obscurest cases of hæmaturia I have empirically employed

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* *Hunterian Lectures*, 1886.

cannabis indica. My first case was really an astonishing one; others since not so clear, but still on the whole not unfavourable." In giving hæmostatics care must be taken not to select such medicines as disturb the digestive apparatus, otherwise harm may be done.

Though, as a rule, renal hæmorrhage is best treated by medical measures, there are some instances where, from the profuseness and continuance of the discharge, operative means may be necessary; these would include, from the illustrations referred to, nephrectomy for ruptures of the kidney, and possibly ligature of a ureter, where the indications were clear as to the kidney at fault.

Hæmaturia must not be confounded with a paroxysmal affection to which the terms hæmoglobinuria and hæmatinuria have been employed; in these conditions, blood corpuscles appear to be invariably absent, or are present in a mutilated and hardly recognisable form. The spectroscope has been used for demonstrating the presence of hæmoglobulin, which is freed by the dissolution of the blood, and in which process the urinary system appears to be only passively engaged. Somewhat similar changes are observed in scurvy, purpura, typhoid, and other hæmic disorders.

Ureters.—Hæmorrhage from this source is in many respects like that from the kidney. It occurs from injuries directly applied over the ureters, from tubercle, and during the passage of calculi. The blood, as a rule, is intimately mixed with the urine, and, as with renal hæmaturia, casts of the ureters, more or less complete, looking like red earthworms, may sometimes be seen in the excretion. Hilton was in the habit of advising that all clots in urine should be floated in water, for the purpose of seeing if their shape indicated whence they came. It is doubtful whether a partial rupture of a ureter is capable of keeping up a hæmorrhage for some time; but it could, however, hardly be of a nature to require operative interference.

The Bladder and Prostate.—Hæmorrhage from this locality is generally indicated by the blood appearing at times unmixed with the urine, and in clots of various size and shape. In diagnosing blood from the bladder reliance will mainly be placed upon the physical examination of the organ with the cystoscope, sound, or catheter in determining its source. In passing any of these instruments for diagnostic purposes, it is hardly necessary to say that every precaution should be taken against doing harm in attempting to do good. A bladder that bleeds from whatever cause is not likely to do so less after a sound has been manipulated within it; the fact that the bleeding is temporarily increased by such an examination is in itself significant. When using a sound or catheter where blood exudes at all freely, before removing the instrument it is a good plan to inject a few ounces of warm water, or, what is perhaps better, equal parts of hazeline and hot water, taking care, if possible, that the bladder is left clean and empty after the examination. Such a bladder is not likely to originate or add to a cystitis, whilst a contracted viscus is the best safeguard against any further hæmorrhage taking place.

In the bladder and prostate will be found conditions occasioning hæmorrhage where direct surgical treatment is more generally applicable, as these organs not only can be readily reached with the finger, but are less influenced by hæmostatics than the kidney. The treatment of tumours of the bladder to a large extent resolves itself into the management of the hæmorrhage which these growths so frequently occasion; in fact, it may be said that a growth within the bladder which neither bleeds nor pains cannot be said to present any adequate reason either for its exploration or removal. Though hæmorrhage from the bladder is an important and tolerably constant symptom of a tumour connected with this viscus, it must not as such be regarded as indicating that less potent measures than those of an operative kind are unavailing. I now possess two specimens of small portions of villous growth where, after long periods of recurring hæmaturia, complete recovery has, I believe, in both instances taken place; on the other hand, an observation of this kind is encouraging in urging the attempt to remove these growths by operation when further delay becomes obviously dangerous. We must not forget that a very small vascular growth in the bladder may keep up a serious hæmorrhage—a growth which it is impossible to diagnose until it is either seen or felt. That such a cause for bleeding was present in the following instance of stone in the bladder I have no doubt:—

Case.—J. S., aged 28, was operated on by me at the Liverpool Royal Infirmary, on September 26, 1883. A phosphatic stone weighing over 4 oz. was removed by the lateral method. He had profuse secondary hæmorrhage on six occasions, from the 6th to the 25th October. After the last bleeding, which nearly killed him, the nurse found amongst some clots an organised mass, about the size and shape of a small raspberry, which had escaped through the wound, and which my house-surgeon (Dr. Pagan Lowe) and I examined. It was very like a villous growth, but more fleshy. Unfortunately it was accidentally thrown away before it was submitted to microscopic examination. After the escape of this, no recurrence of the bleeding took place, and the patient made a good recovery. I regretted that I had not searched the bladder with my finger after the first bleeding, when I should probably have discovered the cause and removed it.

The next case illustrates the sudden death from hæmorrhage into the bladder of a patient believed to be suffering from a vesical tumour.

Case.—In May, 1883, and some months previously, I saw a gentleman, aged 50, with Dr. E. Adam: he was suffering from hæmaturia, and the conclusion we arrived at was that the bleeding was caused by a tumour within the bladder. By the use of matico we were able to restrict the amount of blood lost in this way, and at times it almost disappeared from the urine. At 11 p.m. on October 6, 1883, I was hastily summoned by Dr. Adam to meet him. When starting for a railway journey at five that afternoon the patient suddenly found himself incapable of passing anything but pure blood by the urethra. He returned to the railway carriage, and there remained in agony during five hours. Fortunately, a medical man who happened to be travelling in the same train was able to give some relief by a hypodermic injection. When we saw him on his arrival home that evening we found him semi-conscious, and struggling to empty his bladder. We placed him under chloroform, and made out that his bladder contained a mass almost as large as his head. Being provided with a gum-elastic catheter eighteen inches in length, I succeeded in introducing this, and after it had passed through a dense mass of clot, some bloody urine escaped, and then we were able to get rid of a certain portion of the fluid blood: still the bladder seemed to fill as fast as its contents were withdrawn. We also tried to evacuate the bladder by means of Clover's apparatus for stone fragments, and in the use of this we were to a certain extent successful. The agony the patient had undergone during the railway journey, added to the loss of blood, caused death at 2 a.m., that is to say, nine hours after the sudden hæmorrhage took place. We regretted that the friends would not permit even a partial examination of the body to be made.

This is a case which may be regarded as illustrating probably the most painful aspect of the natural history of some bladder tumours. There are several points worthy of comment in connection with the hæmorrhage proceeding from these growths and its treatment. Occasion may be taken to notice the uniformity with which persons suffering from bleeding tumours of the bladder—especially malignant ones—speak of the sense of relief they experience when slight hæmorrhage, as indicated by the state of the urine, is continually going on, as compared with the entire cessation of this discharge. I have almost learned to regard this symptom as pathognomonic.

It has been frequently noticed how long a time clotted blood, in small quantities, will remain in the bladder, provided it is surrounded by certain conditions. I had a patient under observation who was slowly disintegrating a blood-clot, which, it was believed, had been lying in his bladder for many weeks since the accidental occurrence of a vesical hæmorrhage, which we had reason for concluding had not been repeated. It should be stated that the urine remained acid throughout, and of a somewhat low specific gravity. A blood-clot subjected to the action of alkaline or ammoniacal urine means, as I have found, bacterial putrefaction of the whole mixture, and the rapid development of acute cystitis, unless steps are promptly taken to empty and cleanse the bladder.

Of other expedients in dealing with hæmorrhage may be mentioned the hot douche of water, at a temperature of 110–120° Fahr., applied in a continuous current to the interior of the bladder. It is now some years since I advocated this in connection with certain sensitive conditions of the mucous membrane remaining after attacks of cystitis. In vascular growths of the bladder, where operation was impossible, benefit has followed the persistent adoption of this practice. The following has been found to be a simple plan of effecting bladder irrigation. The apparatus consists of a rubber catheter, a tin vessel capable of holding a quart of water, and some rubber piping: if the connection between the reservoir and the catheter is made with one of Dr. Solomon Smith's junction pipes* (Fig. 44) the bladder can be thoroughly irrigated in this way as by a double-current catheter. The rubber or silk catheters are well adapted for purposes of this kind.

Stone in the bladder often causes slight occasional hæmorrhage, and why this should be is readily understood. Calculi with sharp projections, such as oxalates, seldom move about much, as they are thus rendered more or less stationary. When, however, they get displaced, as by a sudden jolt, most acute and painful cystitis immediately follows.

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* *Lancet*, March 22, 1884.

A patient who was under my care always noticed that after long walking exercise, which he invariably took once weekly, there was blood in his urine. I examined him and found a stone, though none had been suspected. Its removal by lithotrity at once put a stop to this symptom. Hæmaturia in children is more frequently caused by stone and tumours than by anything else. There is a form of hæmorrhagic cystitis which is now rarely seen, thanks to the improved management of the broken stone after lithotrity.

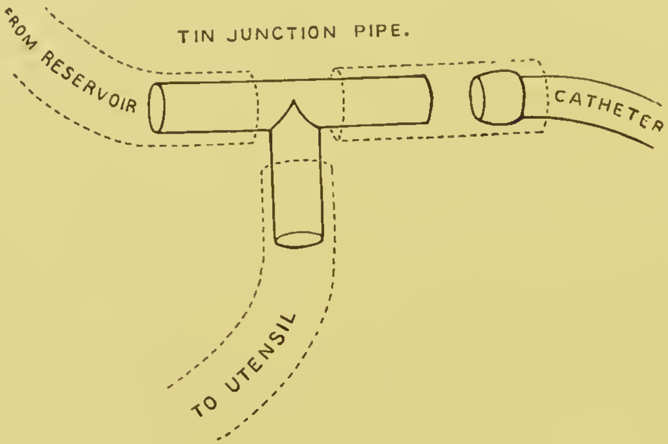

Fig. 44.

A suddenly emptied bladder—I refer to the atonied viscus—will often bleed as soon as it is deprived of the support afforded by its contents. When with residual urine there is occasional hæmorrhage from the dilated veins in the neighbourhood, the regular use of the catheter is indicated. The presence of blood and ammoniacal urine kept at the temperature of the body is sufficient to account for some of the cases of catheter fever we hear of. It should be remembered that an atonied bladder will sometimes exude blood, though no damage is done to it by the instrument. In localising the source of hæmaturia assistance may often be rendered by emptying the bladder with a soft catheter, and then putting in an ounce or so of tepid water. If this returns blood-stained upon its introduction, the bladder or prostate will probably be the locality of the bleeding.

Hæmorrhage from the prostate is sometimes very profuse. An unusual case recently recorded by Mr. Bryant will be referred to in connection with growths of the prostate.

Perplexing instances are occasionally met with where hæmorrhage is maintained by the presence of a stone which cannot be discovered. In a case I attended with Dr. D. Forbes, a young man suffered for some weeks from hæmaturia and cystitis; he was sounded by both of us carefully, but without positively ascertaining that a stone was present. After the last sounding he passed an angular oxalate stone, which I believe was held in the orifice of a ureter, and all his symptoms at once ceased. The further persistence of hæmorrhage would have justified the exploration of the bladder by the median method, failing the discovery of the source by cystoscopic examination. It may not be out of place here to point out that the descent of a calculus from the kidney, or termination of the ureter, may sometimes be favoured or brought about by the distension of the bladder with water. In persons with dilated ureters regurgitation of the fluid may, under these circumstances, take place. I endeavoured to show in a paper * how little it occasionally takes to dislodge a stone which may have been a source of hæmorrhage and pain for some time.

The Urethra.—This canal may be the source of hæmorrhage in the elderly, as the large prostate will sometimes bleed after exposure to cold, such as may follow sitting on a damp seat or in wet clothes. The occurrence of bleeding under these circumstances is sufficient to indicate that the prostate requires looking after, otherwise more permanent trouble may follow. Bleeding of the urethra from gonorrhœa, and from the irritation caused by a stricture, illustrates other phases of this symptom; whilst blows on the perinæum and contusion or rupture of the urethra furnish examples of traumatism where there is but little difficulty in tracing the symptom to its proper source. It is hardly necessary to specify the improper use of urethral instruments—often by the patient himself—or strong urethral injections, as causes of hæmorrhage from this canal.

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* *Lancet*, March 10, 1888.

Endemic Hæmaturia.—This term is applied to forms of hæmaturia chiefly met with in tropical countries, and is dependent upon the presence of a parasite. The *Bilharzia hæmatobia* was first discovered in the portal vessels of man, in 1851, by Dr. Bilharz, of Cairo, after whom Cobbold subsequently named the parasite. In 1864, Dr. John Harley discovered the ova of the worm in the urine of a patient from the Cape of Good Hope. Subsequent investigations have shown that this parasite has a wide area of distribution in Africa, where it affects men and apes, and, to a less extent, sheep and oxen. The diseases of man dependent on its presence are a certain proportion of the cases of chronic endemic Egyptian dysentery, the majority of cases of endemic hæmaturia of Egypt, Natal, and the Cape, and also, in all probability, the endemic hæmaturia of the Mauritius.

This parasite is a unisexual trematode worm; the male, about half an inch in length and rather flattened, acquires a cylindrical appearance from the thinned lateral margins of the body being infolded ventrally so as to overlap and form a sort of channel (the gynæcophoric canal) for the reception of the female during and after copulation. The female is longer and thinner than the male, and quite cylindrical. The eggs are oval, about $\frac{1}{160}$th of an inch in length, and pointed at one end, which is armed with a short sharp spine, terminal in position when the ova are lodged in the urinary passages, but lateral when they lie in the mucosa of the bowel (Zancarol). The outer layer of the ovum is a tough hard shell of keratine; inside this the yolk segments and develops into a ciliated embryo, the shell is ruptured, and the now free swimming ciliated trematode probably passes into the body of some intermediate host belonging to the snail tribe, where it changes into a *cercaria*, to be subsequently again acquired by man through the medium of stagnant drinking water. The cercaria stage and its host are unknown.

I am indebted to Sir W. Roberts for the plate illustrating bilharzia in urine from a case which he had an opportunity of seeing in the Manchester Infirmary (Fig. 45). The patient was a groom, aged 19, in the service of the Viceroy of Egypt, and had been in the habit of drinking unfiltered Nile water, and of eating watercress freely.

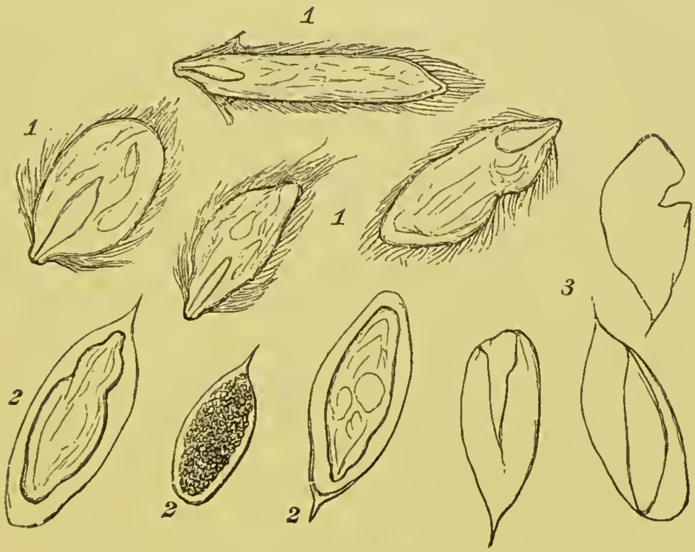

Fig. 45.

Bilharzia in Urine.—1. Free embryos, showing the different shapes they assume as they swim about in the urine. 2. Ova containing unhatched embryos. 3. Empty shells from which the ova have escaped.

In man, the adult male and female worms reside, in a few cases, in the vena cava inferior and its tributaries, but the true home of the parasite is in the portal vein and its numerous tributaries. Kartalis has counted three hundred, mostly in sexual pairs, in the portal system of a single case. The parasites, after impregnation, are to be found in largest numbers in the submucosa of the bladder, ureter, renal pelvis, and rectum. Here, lying in large smooth-walled spaces, which are dilated blood-vessels, the female deposits her eggs, which pass on to the surface of the mucosa, possibly by the boring action of their spines, assisted materially, in the case of the bladder, by the contraction of that viscus. As they become free, the surface of the mucosa is lacerated, and blood escapes freely from the torn capillaries and is discharged with the ova and urine. Although empty shells have been found in the left heart, and many ova in the lungs and liver of some cases, by Dr. Mackie, of Alexandria, still the *Bilharzia infarcta* of Sonsino do not appear to be of frequent occurrence; except in the neighbourhood of the parasite, the position of the parents prevents the ova from making their way into the larger veins, and acts as a block to direct them towards the anastomosing capillaries, which, from their size, they cannot pass along.

When bilharzia are lodged in the veins of the urinary apparatus, they produce symptoms varying according to their number and position. In Natal, especially, many boys harbour the parasite without much inconvenience; their general health is usually good; they have occasional attacks of lassitude, with pain in the loins or perinæum, generally after exertion, and they have intermittent hæmaturia, of which, however, they take but little notice, as it mostly disappears before puberty. The ova may, as Dr. Harley has pointed out, be still present in the urine when all other signs of the existence of the parasite have disappeared. In more serious cases the symptoms are, in addition to those already named, the presence of muco-pus along with the ova and blood in the urine, frequent micturition, vesical tenesmus, and all the signs of chronic cystitis. The blood is usually passed almost pure at the end of micturition, and nearly always contains many ova. *Post mortem,* or after a cystotomy, the mucous membrane is found to be swollen and ecchymosed in patches, usually on the posterior wall of the bladder, or showing here and there elevated thickenings, covered with a gritty material, composed partly of urates or uric acid, and partly of ova. In the interior of the thickenings are many yellowish white specks, made up entirely of ova, lying in dilated vascular spaces. In other cases, where death has resulted from exhaustion or the supervention of typhoid symptoms, the bladder is small and contracted, its muscular wall greatly thickened, and the mucosa and submucosa involved in large irregular elevated lumps, with shreddy surfaces, lying mainly at the base and around the urethral orifice, and constituting a veritable tumour of the bladder (Fig. 46). This drawing is from a specimen sent me by Dr. Mackie, which, with others of the kind, have been carefully examined by Dr. Barron and myself. It represents a section of the bladder, prostate, urethra, and rectum. It will be seen that the upper part of the bladder is normal, whilst the lower is filled with excrescences due to the presence of the parasite. These fungating-looking masses contain large and small chains and nests of ova, running in all directions, and here and there abutting on the surface.

It would appear (Bilharz and Meckel) that sixty-three per cent. of the Egyptian fellaheen are infested with bilharzia.

A case which was in the Liverpool Royal Infirmary under the care of Dr. Davidson, and which seemed at first sight to be one of intermittent hæmoglobinuria, disclosed, on further investigation, the occasional presence in the blood-stained urine of ova closely resembling, if not identical with, those of bilharzia. The patient, a man aged about forty, was a native of the Scottish highlands, and had never been abroad.

When the vessels of the ureter or renal pelvis are the habitat of the parasite, the results are usually more rapidly fatal, from the production of hydronephrosis, of pyelonephritis, or of acute suppuration of the kidneys. Obstruction of the vesical orifice of one or both ureters occasionally takes place from their involvement in the bladder tumours, and hydronephrosis or pyelonephritis may result. Males are much more liable to the disease than females. Provided the patient can be kept alive and free from reinfection, the disease must evidently have a self-limited duration, dependent on the natural period of life of the parasite. This is not yet very definitely ascertained, but appears to vary from one or two to ten years. It is to be noted that the eggs of bilharzia often form the nuclei of uric acid calculi, which may not give rise to symptoms of their presence for

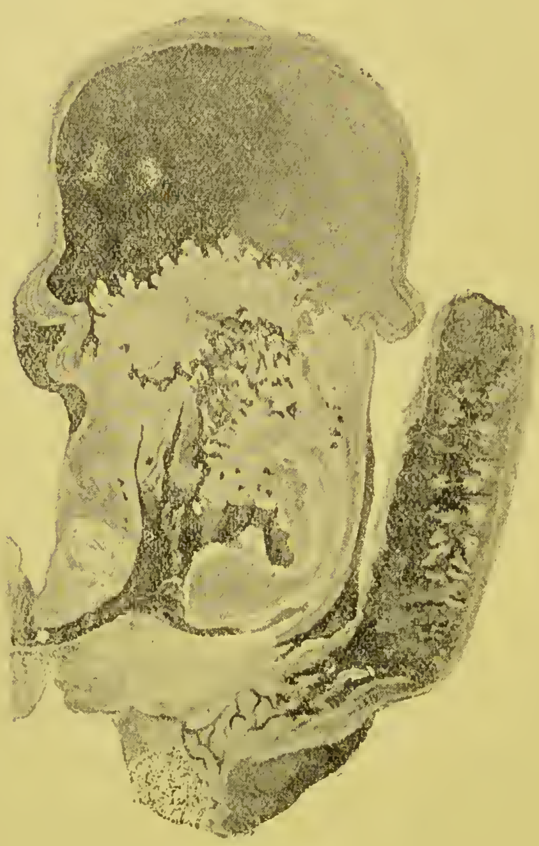

Fig. 46.

some years after all indications of the parasitic disease have disappeared.*

As bearing upon the clinical features and surgical treatment of this disease, I will quote the following remarks by Dr. Mackie relative to a specimen he forwarded me, which was shown at the Pathological Society of London by Mr. Butlin.† It is now preserved in the Museum of St. Bartholomew's Hospital. Dr. Mackie thus describes it:—

> "Specimen of diseased bladder, kidneys, rectum, and dilated and thickened ureters, from a fatal case of severe hæmaturia from Bilharzia hæmatobia. The old man came under my care suffering from dreadful continued pain, and passing almost pure blood mixed with enormous quantities of débris containing ova of bilharzia. To ease the pain and examine his bladder, to see if the surface could be scraped or any tumour removed, I performed perinæal urethrotomy. The bladder was found to be studded full of papillomatous-feeling tumours, bleeding freely. It was no use trying to remove any, as they were in dozens. So nothing further was done. The pain was eased, the hæmaturia diminished, but he died of uræmia a week or two afterwards. *Post-mortem* examination showed that the walls of the bladder were full of small tumours filled with ova."

To another specimen of the same kind of disease, Dr. Mackie refers in the following words:—

> "This specimen is from a man who came to hospital for hæmaturia, passing blood and débris, with pus and mucus, suffering agony. I performed perinæal urethrotomy, and drained the bladder, which, as

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* References to the literature of this subject:
Bilharz.—*Zeitschrift für wissenschaftliche Zool.*, 1851.
Greisinger.—*Archiv. der Heilkunde*, 1854.
Cobbold, T. S.—*Parasites of Man and Animals*, 1879, p. 38.
Mackie.—*Brit. Med. Journal*, Oct. 7, 1882.
Harley, J.—*Med.-Chir. Transactions*, vols. xlvii., lii., liv.
Sonsino, P.—*Archiv. Gén. de Médecine* for June, 1876, p. 650.
Zancarol.—*Trans. Path. Soc. Lond.*, vol. xxxiii.
Wortabet, J.—*Edin. Med. Journal*, 1879-80.
Roberts, Sir W.—*Urinary Diseases*, 4th ed.

† *Trans. of the Pathological Society of London*, 1887.

usual, stopped the hæmorrhage; but he died in about a fortnight after of rupture of the bladder from destruction of the walls by ulceration caused by the bilharzia."

Dr. Mackie goes on to remark:—

"For some years I have been directing my attention to this disease in connection with urinary fistula, which is nearly as common as hæmaturia, and which I have proved to my satisfaction is caused by the same parasite, as in *every case* I find the ova in hundreds in the hard tissue around the fistulous tracks in the perinæum. In every case there is hæmaturia with ova in the bladder, with a history of sudden phlegmon and perinæal abscess, with no history of injury, or stricture, or gonorrhœa, or anything urethral to account for it. For a long time these cases of perinæal urinary fistulæ puzzled me; men came in with their perinæums a large fibrous mass, riddled with sinuses and fistulæ, through which the urine passed on micturition; but no stricture, their urethra admitting easily the largest catheter, or, as often remarked to strangers, I believe their urethra would take in my little finger, and no history of previous stricture."

Various suggestions have been made relative to treatment, their object being to effect the destruction of the parasite in the blood. Harley recommends the administration of the oil of turpentine and of the male fern, with a little chloroform, in order to expel the ova from the urinary passages, and a solution of bicarbonate of potassa to relieve renal irritation. Dr. Fonguet* also advocates the use of male fern, observing that "the blood disappears from the urine after a few days' treatment. I employ the capsules of the ethereal extract of male fern, taking care to administer the medicine one hour before meals." For a similar purpose I believe the iodide of potassium, in twenty grain doses, has been given.

Though I have no personal experience in the treatment of this affection, I should feel disposed to try, where the bladder was involved, a solution of corrosive sublimate as a wash (1–10,000); its use as a bactericide holds out some hope that it might be serviceable in the destruction of this parasite. Where perinæal section is employed, as illustrated in the cases referred to, for the purpose of clearing the bladder of the excrescences formed within its interior by these parasites and their ova, irrigation with a suitable solution of corrosive sublimate seems worthy of trial.

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* *Provincial Medical Journal*, July 2, 1888.

This disease, though chiefly affecting the urinary apparatus, is not limited to it, but frequently involves the intestinal canal, producing symptoms simulating dysentery and disease of the lower bowel. Amongst the specimens forwarded to me for examination is a polypoid parasitical excrescence, in reference to which Dr. Mackie states:—

> "This is a tumour removed by the écraseur from about four inches up the rectum of a man who came to me complaining of dysentery and prolapse of the bowel; he is now about, the dysentery and prolapse having disappeared since the operation. This man had also ova in his urine, but passed only a drop of blood at the end of micturition."

When we consider the serious injury which is done to native populations by this disease, in addition to the risk of contracting and spreading it that is incurred by troops and others visiting these districts, the importance of a more thorough knowledge of it, in relation to its prevention and treatment, must be admitted.

By the kindness of Dr. Mackie, I am able to add a description* of some further specimens of bilharzia as seen affecting the urinary apparatus I have examined.

I. Bladder received in 1887. Half of this was sent to the Owens College museum, and sections cut by Dr. Harris showed many ova lying in the blood-vessels, and also carcinoma, with well-marked cell-nest formation (epithelioma). No history of case received.

II. Bladder and kidneys of a fellah, aged 40, from Damanhour, who died March 6, 1888. This patient came for relief to the Deaconesses' Hospital, thinking he was suffering from stone in the bladder. On sounding, no stone was detected, but a large hard tumour was felt above the pubes, and the interior of the bladder seemed to be covered with small growths. The urine, which was bloody and purulent, contained ova of bilharzia in the sediment. The tumour was supposed to be either entirely due to bilharzia or partly cancerous. Perinæal urethrotomy was performed, and the mass explored with the finger, but it was found impracticable to interfere with it. Microscopic examination showed it to consist of a glandular-celled carcinoma rich in cell columns and acini, poor in stroma, no cell-nests, many ova, with much thickening of muscular coat and dilatation of lymphatics.

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* *Lancet*, July 27, 1889.

III. Bladder of a fellah, aged 25, from Damanhour, who died Jan. 25, 1888. The patient was admitted with a large, irregularly-shaped phosphatic calculus, complicated with bilharzia. Supra-pubic lithotomy was performed on Jan. 13. The cause of death was pelvic cellulitis. Examination of the bladder showed thickening of all the coats, much inflammatory effusion in mucosa and submucosa, immense number of bilharzia ova in patches, in mucosa and submucosa especially. In parts the ova were so numerous and so closely packed that the bladder tissue lying between the strings of ova was with difficulty to be distinguished.

IV. Pieces of bilharzia growth taken from the bladder of a fellah during a lateral lithotomy performed on March 6, 1888. The stone was composed of phosphates. Microscopical examination showed these growths to be partly inflammatory tissue, but mainly of cancerous formation, having the structure of a squamous-celled carcinoma (epithelioma). Well-marked cell-nest formation; few ova.

V. Bladder of a fellah, aged 30, who died March 15, 1888, from septicæmia following a lateral lithotomy performed on March 5. At the *post-mortem* examination, an opening one inch in diameter, with an ulcerated margin, was found in the posterior wall of the bladder. The viscus was very thin around it. About three ounces of pus were found in the cellular tissue behind the bladder. Microscopical examination showed squamous-celled carcinoma, much cell-nest formation, with very few ova in the sections examined.

It will be observed that in four of these five cases of bilharzia cancer was present as a complication. Prolonged investigations in places where such cases are common, relative to the frequency with which bilharzia, cancer, and calculus coexist, and the order of their appearance, would be of value in reference to certain points in the natural history and pathology of these three affections. Whether the parasite merely plays the part of an irritant in a person in some way predisposed to generate cancer, or whether the relationship between the parasite and the proliferous tissue growths which we are accustomed to speak of as cancer is even still more connected and intimate, are points amongst others which naturally become prominent in connection even with such brief and casual records as I am presenting.

SEVENTEENTH LECTURE.

URINARY TUBERCULOSIS.

TUBERCULAR disease of the genito-urinary organs has much in common with what is observed when it attacks other parts of the body. In the first place it is distinctly hereditary, and we usually find that a patient's predecessors suffered from some form of tubercular disease. The family history, therefore, is an important investigation, and should be carefully gone into when there are grounds for believing that the disorder may be of this nature.

Secondly, the disease corresponds in its occurrence with that period of life when the development and use of the sexual organs are commencing and continuing to be active; it is essentially a disease of adolescence and of vigorous, though not necessarily robust, manhood. It is comparatively rare in women. When tubercle attacks females the most frequent seat is the lungs, and why their sexual apparatus enjoys this comparative immunity is not at first sight so apparent. It may be, and certainly is to some extent, due to the fact that females are less exposed than males to what I may term the excitants, or perhaps more correctly the localisers, of this disorder. In tubercular subjects, protracted gonorrhœa and its complications, more frequently than all other causes put together, determines the deposit to some part of the urinary tract, from which it slowly spreads to other parts of the system. A chronic orchitis is a constant precursor of urinary phthisis. Women, though they suffer from gonorrhœa, do not do so in the same way or to the same degree, nor are their complications of the disorder so protracted or severe. Further, they are more readily cured. Tubercle may invade the urinary organs either from the kidneys downwards, or the testes upwards; these are the more usual modes of accession. In the female, a labial abscess is often the initial lesion, as inflammatory deposit in the testes may be in the male.

It will not be necessary for clinical purposes to occupy much time with a description of the mode in which tubercle invades the normal tissues, its varieties, or its chemistry; information of this kind will best be obtained from the more recent works on pathology. In the form of grey miliary granulations, or as yellow caseous masses of various sizes, tubercle may be met with indiscriminately in any part of the genito-urinary apparatus: it is found in the kidney, the ureter, the bladder, the prostate, the vesicula seminalis, the testis, the epididymis, and the urethra; wherever implanted there is no knowing where it will spread to. It will be seen that the tendency to spread is an important feature in relation to points connected with diagnosis and treatment.

Urinary tuberculosis, when the deposit is in relation with the mucous tract from the kidney downwards, is almost sure to be associated with one or other of three symptoms, though as a rule they are all present in varying degree. These prominent symptoms are hæmaturia, frequent micturition, and excess of, or change in, the urinary mucus.

Hæmaturia stands in relation to this phase of the disorder as hæmoptysis does to pulmonary phthisis: it is frequently an early symptom, though the amount of blood lost in this way is generally small. The profuse hæmaturia of urinary tuberculosis is usually associated with its later stages of ulceration. I have seen a considerable amount of blood lost from those excavating ulcers of the bladder which are common in the course of this disorder. Then there is frequency of micturition, which, as a rule, when the kidneys only are involved, is not explainable by anything that the surgeon can detect; and, lastly, there is a considerable excess in the urinary mucus. These are symptoms which, when they continue and are otherwise unaccounted for, are very significant. When the disease has made more advance, either in the kidney, bladder, or prostate, the urine becomes charged with pus and other signs of disintegrating tissue. It is curious to notice how, even under these circumstances, the urine retains an acid reaction; it is not until it undergoes decomposition, by the retention within it of pus and unhealthy lymph, that it becomes offensive and ammoniacal. A person who is infected primarily with urinary tuberculosis not unfrequently develops symptoms of a subacute form of peritonitis, which shows that the disease has invaded by contiguity more or less of the intestinal tract. In this way I have on several occasions seen the disease brought to a termination with a swollen, tender, and tympanitic abdomen.

Tubercle of the kidney in its earliest form is not unfrequently found to be a cause of incontinence and urinary irritability in children. Many children, especially males, who were suspected of stone, proved to have tubercular kidneys. In an instance that came under observation, the prepuce of a child had been removed with the hope that this might relieve the urinary irritability; extensive renal tuberculosis, with almost entire atrophy of one kidney, was shown after death to have been present.

The following case illustrates some features to which reference has been made :—

Case.—E. S., aged 11, a schoolboy, was admitted into the Royal Infirmary on June 19, 1882. About eight weeks before admission the patient after micturition passed some pus, which he described as being in little nodules. The symptom continued occasionally for twelve days. This was followed by the discharge of minute clots of blood at intervals after micturition. On admission, in addition to this history, he said he micturated frequently with pain referred to the penis and neck of the bladder. He was a fair, delicate-looking boy, and for twelve months had often complained of headache. The urine was normal in appearance; sp. gr. 1010, acid; contained mucus and a trace of albumen. On June 20 I introduced a sound under ether, but no stone could be detected. Volkmann's bimanual method of examining the bladder was then employed, when a nodule at the fundus was distinctly felt. In the evening the temperature rose to 102°, falling in the morning to 97°. The patient was placed on a milk diet, and kept in bed. The evening rise in temperature continued.—24th: It was noted that he was slightly delirious during the night. Cold applications to the head were employed.—26th: Had a very restless night. In the morning he passed into a semi-conscious state, with strabismus and other symptoms of acute tubercular meningitis.—On the 27th he remained in much the same state of semi-unconsciousness. Some urine that he passed was found to be of sp. gr. 1020, acid, one-sixth albuminous; tubercle bacilli were discovered by the microscope.—30th: Died, having been quite unconscious for some hours. *Necropsy.*—Lungs contained recent miliary tubercles. Liver was normal in size, also containing tubercles. The right kidney was healthy, ureter dilated; the left was enlarged, and, on section, the pelvis and calyces were dilated, and contained a yellow exudation membrane. This yellow, almost puriform, membrane extended along the whole length of the dilated left ureter to the bladder. There were tubercles in the substance of the kidneys, and some of the pyramids were partly absorbed. Bladder: The mucous membrane was covered with a multitude of minute superficial ulcerations of a tuberculous kind; the mucous membrane of the trigone was roughened; at the fundus a caseous tubercular nodule was found which had been felt during life. Brain: Convolutions flattened, lymph at base, ventricles very much dilated; recent miliary tubercles were found in both Sylvian fissures.

In this case, the detection of tubercle bacilli in the urine assisted the diagnosis. In distinguishing doubtful cases, I have sometimes found the thermometer of great assistance: if there is urinary tuberculosis, the temperature, with other symptoms, seldom fails to give us a good hint.

Of the various operations employed for the relief of urinary affections I do not know one that has given more relief than cystotomy; the least favourable cases in my experience have been those where it has been resorted to for conditions arising out of urinary tuberculosis. When undertaken solely with the object of relieving the intense reflex irritation—the frequent micturition—which often attends the early deposit of tubercle in the urinary apparatus from the kidneys downwards, it is generally a failure. When, however, it is performed for the purpose of giving exit to the products of tubercular suppuration, to pus, lymph flakes, and offensive putrefying urine, then, on physical grounds, it may prove of some service. I have known, in cases of urinary tuberculosis, the desire to micturate quite as distressing to the patient though urine was flowing continuously and incontinently by a perinæal drain. For the same reason, overdilatation of the female urethra, with the intention of causing temporary incontinence, does not relieve the reflected irritability of urinary phthisis. The following case illustrates some of the points I have referred to:—

Case.—A boy, aged 4, came under my care at the Royal Infirmary, at the request of Dr. Little, of Everton, on the suspicion that he had a stone concealed somewhere in the urinary organs. He had many symptoms of this complaint, but, though he had been sounded several times, no calculus could be felt. He was the child of strumous parents, and was singularly bright and intelligent. Twelve months previously he commenced to wet his bed at night, and to suffer from urinary irritability in the daytime. Occasionally small quantities of blood had been detected with the microscope in the urine, which was invariably acid and opaque. Within two months prior to his admission the urine had been charged with mucus and pus, the expulsion of which from his bladder caused much spasm and suffering. To aid micturition and to mitigate the pain, he acquired the habit, which at last became constant, of pulling at his penis. He seemed, as it were, to milk away the urine and what it contained from his bladder. It was under these circumstances he came into the Infirmary, when it was found necessary to give him sedatives freely. The urine, always granular-looking and opaque, now and then contained something which looked more like the white of an egg half boiled than anything else. He was sounded under ether, but nothing abnormal could be detected. Towards evening he generally had a rise of temperature, and there was a hectic tendency. To alleviate the constant pain and spasm of micturition, a median cystotomy for drainage was performed, but with little benefit. The spasm and vesical tenesmus continued unabated. In the course of a month the child died with renal symptoms and a gradual suppression of urine. *Post-mortem* examination showed nothing wrong with the bladder or urethra. The ureters were dilated, and the kidneys cystic and tubercular. Some of the cysts thus formed, communicating with the pelvis of the kidney, contained thick gummy-looking mucus, similar to that which was observed in a more diluted form in the urine; the cyst-walls seemed to be engaged in secreting this viscid matter, which, obviously, with some difficulty had found its way along with the urine down the ureters. This was the explanation of the dilated ureters, the bladder-spasms, and irritability, which led to cystotomy being practised. Without such an explanation it was difficult to understand how the ureters could be dilated and yet no stricture exist in the urethra.

This case makes prominent the following points: 1. That urinary incontinence or irritability in children may proceed from renal tuberculosis. 2. That though cystotomy may relieve the pain and spasm attendant upon the expulsion of the unhealthy urine from the bladder, it does not relieve the symptoms, which are due to the same urine passing down the ureters. In some cases of this kind there might be reasons for opening and draining a cystic kidney, with the view of preserving what remains sound in structure, as well as of preventing the constant spasm or colic which is aroused by the products of the disorganised organ forcing a way along the ureters. 3. That such a case serves to illustrate those extremely rare instances (of which but few specimens are known to exist) where stones in the bladder have been enclosed in fibrous or gelatinous envelopes. By the kindness of Mr. Bickersteth I had not only an opportunity of examining and preserving a well-marked specimen of what these tubercular cysts in the kidney are capable of pouring along the ureters into the bladder, but of ascertaining how these semi-fibrous stones are probably formed. This subject will again be referred to in connection with sounding of the bladder for stone. The possibility that in a tubercular subject a small stone in the bladder may be wrapped up by a sort of mucoid investment, furnished by a cystic kidney, must not be lost sight of in the investigation of obscure cases of vesical stone; whether or not, the explanation I have offered as to their formation is a satisfactory one.

In the diagnosis of urinary tuberculosis in the male, the careful examination of the testes and prostate with the finger often furnishes valuable evidence as to the probability of tubercle existing in some other portion of the genito-urinary apparatus which is beyond reach of manipulation. When deposit in these parts exists with signs of functional irritation in the urinary apparatus generally, the suspicion that tuberculosis exists is exceedingly strong, particularly if the patients are adolescent males and the family history points to a strumous diathesis. The following case I saw, in consultation with Dr. Glynn, in the Royal Infirmary, illustrates the importance of a physical examination in cases of this kind:—

The patient, a youth, aged 19, was admitted in February, 1884. *History.*—A strong family history of consumption. Patient had good health up to two years before admission, he then began to fail generally. For twelve months he had been suffering from a short dry cough, and pain in the region of the kidneys had been present for three months. On admission he was much emaciated. There was pain on pressure in the left lumbar region and much tenderness over the liver. Urine was passed twelve to fourteen times daily, with smarting pain over the pubes both before and after urination; it contained much pus, but no bacteria were found. The prostate was examined by Mr. Harrison, who found it made up of round nodulated masses. In one testis there was some deposit in the globus minor. These symptoms continued until death took place, on March 8. *Autopsy*, seventy-two hours after death: The whole of both lungs were studded with miliary tubercles, many of which were commencing to caseate, but the caseation in no instance was advanced. In the transverse and descending colon there were two large typical tubercular ulcers, about twelve inches apart. The right adrenal was small and soft, containing a mass of yellow tubercle. The left adrenal was full of caseous material and calcareous matter. The kidneys were large, the tissue of each was almost destroyed, its place being occupied by large and small caseous nodules and cavities. The renal tissue remaining was studded with tubercle. The ureters were dilated. The bladder was small and hypertrophied, and contained pus and urine. The mucous membrane was studded with tubercular ulcers. Leading into the bladder was an opening into the prostate, which was softened and riddled with cavities full of caseating matter. The mucous lining of the urethra was discoloured. The globus minor of the right testis contained a caseous mass the size of a large pea, the body of the testis was hard and fibrous—the specimen was shown at the Medical Society by the late Dr. Rich.*

A few remarks may be made in reference to the treatment of a tubercular condition of a system of organs which is more common than we may at first sight be inclined to believe. In the early stage of the disease the patient requires almost the same attention as in pulmonary phthisis, so far as climate, diet, clothing, and medicines are concerned. I often prescribe small doses of perchloride of mercury, with advantage, before softening takes place. A suitable sea voyage is sometimes of great service in these cases, when the state of the urine and the act of micturition does not render this out of the question. I have already stated that cystotomy, or other operative proceeding, is not to be recommended unless the urine becomes so greatly disordered and the bladder so irritable as to seriously add to the distress of the patient in voiding it. For this irritability I recommend the use of morphia, either by the mouth or in suppositories, in preference, as a rule, to anything else. The quantity of morphia required in some cases of urinary tuberculosis is occasionally considerable, as exemplified in the following instance :—

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* *Liverpool Medical and Chirurgical Journal*, January, 1885, p. 219.

CASE.—In October, 1883, I saw, with Dr. Paton, of Rock Ferry, a patient (A. W., aged 17) who was subsequently admitted into the Royal Infirmary. I was doubtful at first whether he was suffering from extensive tuberculosis of the prostate and bladder or malignant disease. In January, 1884, in consequence of pain, hæmaturia, and the state of the urine, I performed cystotomy. This relieved some of the symptoms, but not the irritability. For the latter, morphia was prescribed, the daily use of which for distinctly therapeutical purposes eventually amounted to seventeen grains. Under this treatment, with cod liver oil and tonics, he steadily improved and left the Infirmary. In October, 1886, he reported himself as perfectly well, so far as the urinary symptoms were concerned, but he had not been able entirely to discontinue the morphia.

When the urine is very offensive, the bladder may be washed out with some antiseptic fluid, but if this occasions hæmorrhage from the tubercular spots, it had better be dispensed with. Guyon employs for this purpose small injections, or instillations, as he calls them, in preference to general irrigation of the viscus. As a local application to the tuberculous bladder I have found more benefit from iodoform suspended in mucilage in the proportion of five grains to the ounce of water.

Much stress has been laid on the infection of tubercle, and the necessity of early removing the primary deposits when they can be readily got at. In reference to this point, Dr. F. W. Rockwell,* of Brooklyn, remarks: "I believe the treatment of tuberculous testicle should be that of strumous disease of any other gland, and that early removal, either of the caseous masses or of the whole diseased organ, should be more generally practised than at present." The indications calling for the adoption of this principle will best be considered in connection with the diseases of the separate parts involved.

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* "Tuberculosis of the Genito-Urinary Tract," *New York Medical Journal*, January 10, 1885.

Tuberculin has been employed to some extent in the treatment of this form of tuberculosis, but no good, so far as I can ascertain, came of it. Writing upon this subject Mr. Hurry Fenwick * observes: "The swelling of the peri-tuberculous tissues led to suppression and retention of urine, and the use of the lymph was liable to produce hæmorrhages. The tuberculous deposits could by means of the cystoscope be seen to swell up in the same way as in the skin, and new deposits came into sight." Where, for instance, both ureters are involved, it is obvious from such observations that complete stoppage of urine might be one of its effects.

There is a remote effect of tuberculosis to which I would just refer. We occasionally meet with cases where tubercles have become cured by cretification. Such deposits in the bladder and prostate cause frequent micturition, and give rise to a suspicion that the person is suffering from stone. The history of the case, and the observation that these calcareous spots are fixed and not movable when felt with a metal sound, usually enable the practitioner to diagnose them without much difficulty.

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* *Lancet*, May 1, 1891.

EIGHTEENTH LECTURE.

FUNCTION OF THE PROSTATE—MODE OF EXAMINATION—PROSTATITIS—ABSCESS—GOUTY PROSTATITIS.

BEFORE proceeding to consider the methods of examining the prostate for surgical purposes and what can be learnt from them, a brief reference may be made to the probable function of the part. Structurally the prostate may be summed up as consisting of unstriped muscular fibre, in which a considerable amount of tissue engaged in secretion is embedded. From this we may infer that, though occupied in glandular functions, probably in connection either with the elaboration or the dispersion of the seminal fluid, the prostate in addition possesses muscular powers. That the latter are not restricted to the sexual act, but are also associated with the function of the bladder in its capacity as a reservoir for the urine, is a conclusion that I have not seen any reason to alter.

In support of this, attention may be directed to Professor Viner Ellis's paper "On the Muscular Arrangements of the Genito-Urinary Apparatus."* In reference to the impossibility of dissociating the functions of the bladder and prostate, this author remarks: "I would propose the name *Orbicularis vel Sphincter Urethræ* for both the prostate and the prolongation around the membranous urethra; whilst I would confine the old term 'prostate' (without the word gland) to the thickened and more powerful part near the neck of the bladder. This orbicularis may be considered as only an advanced portion of the circular layer of the bladder, though it must have the power of acting independently of the vesical fibres." This view seems confirmed by what is observed in connection with certain surgical operations on the urethra, of which the prostate forms a portion. Openings may be made into the urethra in any part of its course, as high up as what we term the apex of the prostate, without incontinence of urine following. I have seen in cases of lithotomy by the median operation patients retain full control over the bladder during the whole period of their convalescence, in spite of the dilatation to which the prostate has been subjected by the introduction of the finger and the extraction of the stone. Directly, however, the knife impinges to any appreciable extent on the prostate, as in the lateral operation for stone, incontinence from that moment takes place: the patient has no command over his urine; he can neither collect nor expel it; and in this condition he remains until the healing process has made considerable advance. Some instances I have examined, where permanent incontinence of urine followed the operation of lateral lithotomy, appear to have been connected with the complete division of the prostatic ring, by too free an incision. In cases of extroversion of the bladder where there is no receptacle for the urine, the prostate is only met with in a rudimentary form. In advanced life, so far as I have been able to ascertain, hypertrophy never occurs in these malformations. I have recorded a case * where incontinence of urine in a boy appeared to be associated with an arrest in the development of the prostate.

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* *Royal Med.-Chir. Trans.*, vol. xxii.

It seems likely that the office of the prostate relatively to the sexual act is that stated by the late Dr. Handfield Jones, † in the following passage :—" These considerations furnish

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* *British Medical Journal*, July 16, 1889.

† *London Medical Gazette*, vol. v., 1847.

some ground for regarding the prostate as rather an assemblage of mucous follicles than really a distinct conglomerate gland; its part in the generative function is probably not to prepare any essential element of the fecundating fluid, but merely an appropriate viscid material involved in which the seminal animalcules may be more securely transported on their destined route." The recent investigations by Mr. Joseph Griffiths* on the structure of the prostate will be read with interest.

The examination of the prostate is best made by placing the patient, when feasible, with his abdomen over the head of a sofa, or supported by pillows over the side of the bed, with the shoulders depressed and the legs slightly apart. By this plan the finger enters the rectum with less resistance, whilst the surgeon has his hand freer with the palmar surface of the index finger directed towards the part. Care should be taken that the bladder is empty, otherwise an erroneous impression may easily be formed. I would advise opportunities to be taken of examining patients with healthy prostates, so as to better estimate what constitutes a normal condition relative to the bladder and its contents.

In early life, at sixteen years of age or thereabouts, it is not easy to make out exactly the boundaries of the prostate; the parts are soft and yielding, and slight structural differences are not readily recognised. Under these circumstances I generally pass a soft bougie into the bladder; this supplies something to feel upon, and textural alterations, such as slight tubercular deposit or new growth, are readily felt.

In many prostatic cases the statement of the patient may almost be anticipated if the examination is thorough. Let me illustrate what I mean. The *size* of the part will enable you to judge of atrophy and hypertrophy; *sensitiveness* will cause you to detect inflammatory conditions; whilst *consist-*

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* *Journal of Anatomy and Physiology*, vols. xxiii., xxiv.

ence leads you to form an opinion as to fluid, tumour, cysts, tubercle, and the kind of hypertrophy, whether fibrous or muscular, and so to prognosticate the course of events. For instance, the detection of a small deposit, perhaps not larger than a millet seed, has indicated, with collateral evidence, that the urinary apparatus was infected with tubercle.

Of all the complex structures from the kidneys downwards, which together constitute the genito-urinary tract, the prostate may be regarded as the least liable to attacks of acute inflammation, and in this respect it seems to serve a wise purpose in acting as a check against the extension of inflammation from the exposed and susceptible urethra below to the more vital organs above. Structural differences of this kind play an important, though not a sufficiently appreciated, part in limiting the progress of a variety of pathological actions, which otherwise, by continuity, would spread almost unrestrained.

Under the term "acute prostatitis" we recognise two varieties, presenting distinct pathological features, each determined by different circumstances, and disposed to pursue a tolerably definite course. The one will be spoken of as acute follicular, the other as acute general or parenchymatous prostatitis. These terms will not only be found convenient in localising the effects of inflammation as observed in the part, but are also free from anything like an artificial distinction.

Acute follicular prostatitis is not a very uncommon form, being most frequently seen in connection with gonorrhœa. A person with this affection suddenly finds the discharge either diminished or altered in character, and this is followed by a sensation of weight or uneasiness in the perinæum. The prostate is found to be hot, tender, or swollen; micturition becomes frequent or impeded in accordance with the extent to which the bladder structurally sympathises or the gland obstructs. In some cases there is complete retention.

The inflammation in these instances will be found almost entirely confined to the follicles of the part. These may suppurate individually, or a limited abscess may form by the fusion of two or more of them which have thus become obstructed. "There is never, then," as Bumstead* remarks, "at the outset one abscess of considerable size. Such occurs only by the coalescence of a number of small ones seated in the follicles. Meanwhile, the muscular tissue, which constitutes so large a portion of the prostate, is unaffected, except that it is in a constant state of contraction, thereby inducing urethral and rectal tenesmus."

And what is true of the normal prostate, in regard to the insusceptibility of its muscular portion to inflammatory action, is apparently still more so when it is hypertrophied and the proportion of muscular and connective structure is increased. And if proof of this were required I would point to the tolerably hard usage the part sometimes receives, when in the course of its growth it impedes micturition and becomes an obstacle to the introduction of the catheter. Though nearly every museum furnishes instances where, either by accident or design, the outgrowth has been more or less riddled with perforations, or shows other signs of active, though possibly necessary, treatment, yet examples of suppuration or inflammation occurring under these circumstances are comparatively rare. The impunity with which forced catheterism in enlarged prostate has been practised is, I believe, the only excuse for its recognition by writers on this subject.

The follicular is the simplest form of acute prostatitis. Though painful and distressing while it lasts the symptoms are not usually protracted, and the prognosis is favourable. Recovery follows by resolution, suppuration being the exception and not the rule.

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* *The Pathology and Treatment of Venereal Disease*, by Bumstead and Taylor; 5th edition, New York.

The other kind of prostatitis, acute parenchymatous or general, is much more injurious. It is as if the whole part within the capsule were invaded with the inflammatory action. Suppuration usually rapidly supervenes, and unless treatment is prompt and decisive on the detection of fluctuation by rectal examination, the most serious consequences are likely to follow. The morbid process closely resembles what, in other parts of the body, we are accustomed to speak of as an acute phlegmon. Owing to the violence of the inflammation, the structures outside the capsule become more or less infiltrated with serous effusion, or even pus—a condition which has been described as peri-prostatitis.

At the outset it is not easy to determine which of the two conditions referred to we have to deal with. The causes producing them are much the same, and we must look for other circumstances as determining whether the inflammation will be limited to the follicles or will involve *en masse* the entire part. We have only to see the kind of persons who suffer from acute parenchymatous prostatitis to recognise the conditions favouring it. Speaking generally, they are individuals of either deteriorated constitutional powers, as highly strumous subjects, or with urinary organs more or less damaged by long-standing obstructive disease, and who have been exposed to some fresh exciting cause, such as the gonorrhœal poison. Under these circumstances the occurrence of suppuration must be carefully looked for, as the spontaneous escape of matter in such directions as the rectum, bladder, and peritonæal cavity is likely to be speedily fatal.

Abscesses, sometimes of very considerable size, may form within the limits of the prostate without giving rise to such symptoms as are usually provoked. A case in point is recorded by Sir H. Pitman, at St. George's Hospital, where prostatitis supervened upon an attack of gonorrhœa, and terminated in suppuration and death of the patient, with an entire absence of rigors and the ordinary symptoms.

Sir Andrew Clark* has recorded a case of acute prostatitis, with discharge of hyaline cylinders resembling renal cylinders. He thus comments upon it: "These cases with prostate casts in the urine may be only curiosities of medical experience, but since in none of the standard works on urinary affections, in no monographs dealing with diseases of the prostate, can any reference be found to the discharge of hyaline cylinders in prostatitis, and without careful examination they might very easily be mistaken for cylinders originating in the kidney, I have thought the case was of sufficient importance to bring it before the notice of this society." Though I cannot recall an instance of this kind in my own practice, this reference will be useful.

Prostatitis sometimes seems to be set up by inflammation in an adjacent part. In 1889, I saw a gentleman, aged 36, who suffered in this way a fortnight after a carbuncle over the left hip had opened. There were no other symptoms of general infection, and in the course of a short time recovery followed. The prostatic symptoms were pain at the end of the penis, much spasm and difficulty in urinating, and, eventually, pus in the urine. No urethral instruments had been previously passed, nor was there any other cause discoverable.

Gangrene of the prostate as a result of inflammation is rare, but I believe it is occasionally observed. I have seen it after lithotomy in an unhealthy adult, and thought that the softened and putrescent condition which the gland presented of a young man who died after symptoms of prostatitis, with renal complications, was another example.

Let me refer to two conditions which simulate acute follicular prostatitis, one of which has probably led to the impression that this disease is more common than it really is. The first is inflammation and suppuration around the membranous portion of the urethra as a consequence of

* *Clinical Society Transactions*, Jan. 8, 1886.

urethritis; and the second, inflammation and plugging of the veins constituting the prostatic plexus. I have seen instances of the former where inflammation and suppuration around the membranous urethra have led to the belief that the case was one of metastasis of the gonorrhœal inflammation from the urethra to the prostate. And the points of resemblance are by no means isolated—there is, in fact, a remarkable likeness between the two conditions. In both, there is a cessation or an alteration in the character of the urethral discharge, a feeling of weight and uneasiness about the perinæum, difficulty in micturition, perhaps amounting to retention; and in both some tumefaction is to be felt, and on introducing the finger into the rectum, so sensitive is the latter that it often leads to an imperfect examination being made, and hence an error in diagnosis arises in fixing the position of the tumefaction, which might have been avoided. On the other hand, in inflammation and suppuration around the membranous urethra, though this part lies between layers of fasciæ, there is more or less perinæal tumefaction and tenderness.

The other disordered condition which may simulate prostatitis is uncommon. I have only seen two cases of it, and both came under notice about the same time. The primary lesion was rapid œdema of the prepuce, dependent upon plugging of the dorsal vein of the penis. This was quite obvious. In the course of a few days each patient complained of perinæal weight, frequent rather than painful micturition, with great uneasiness referred to the neck of the bladder, which led to its being suggested that in each case the prostate was inflamed. Both patients were gouty; in one the œdema was attributed to gonorrhœa; in the other to a strong injection. In each it was determined by rectal examination that the vesical pain and irritability were not due to any inflammation of the prostate, but to the extension of the vein-blocking to the prostatic plexus.

Before leaving the subject of abscess in relation with the bladder, I would refer to some rather rare instances of post-vesical suppuration where the limits of the prostate are lost in a general tumefaction. Though the first impression points to abscess in the prostate, this is not the case. I believe these suppurations are connected with an inflammatory condition, tubercular or otherwise, of one of the seminal vesicles.

Case.—In November, 1888, I saw a gentleman, aged 33, in consultation with Dr. D. U. Maclennan. He had been suffering from constipation for some days, and it was considered possible that his bowels were now obstructed, which undoubtedly was the case. He had been ill for a fortnight, the symptoms commencing with diarrhœa. When I saw him he had retention of urine, and the rectum was compressed backwards by a rounded mass which, one would say, was almost as large and as firm as a cricket-ball. I could not discover fluctuation. It was impossible to pass the finger into the bowel, and a previous attempt to administer an enema had failed. There was some tenderness in front on pressing deeply towards the pelvis over the centre of the left Poupart's ligament. There was no abdominal distension.

I introduced a curved trocar and cannula, such as at one time we used for tapping the bladder from the rectum, and punctured the swelling deeply about its centre. This gave immediate escape to several ounces of thick offensive pus, which we noticed escaped more freely when pressure was made over the tenderness that was mentioned as existing below Poupart's ligament. As the matter escaped the outline of the prostate could be recognised by the finger, clearly showing that this was not the part involved, as the swelling was distinctly above it. This treatment gave complete relief, the voluntary power of micturition returned, and the bowels were naturally moved the following morning. The patient made an uninterrupted recovery without requiring further surgical assistance.

In another case of this kind which has been more recently under observation, recurring attacks of inflammation, with probably some suppuration, obscuring the prostate, are, I feel sure, connected with irritation proceeding from a seminal vesicle. Though yielding temporarily to treatment, further measures will probably be necessary.

I will say a few words about treatment. I know of nothing which at the outset of an attack of prostatitis gives greater relief than free leeching of the perinæum, followed by hot applications. Purgatives are not to be recommended in this affection. When we consider how closely related the levator ani muscle is to the prostate—how every movement of it necessarily aggravates the sufferings of the patient—I am at a loss to understand how such measures can be advised by anyone who appreciates the good work of the late John Hilton in reference to the importance of rest in the treatment of an inflammation. If a distended rectum requires relief, a copious enema of hot water will answer every purpose, and, in addition, be found most soothing. In some instances of threatened suppuration of the prostate, patients have experienced great relief from frequently injecting warm water into the bladder by means of a syringe and a soft rubber catheter. Such injections tend to prevent the accumulation of mucus within the prostatic urethra, and in this way avert the formation and collection of matter in the follicles. The use of opium in some form or other will be found essential in protecting the powers of the patient from being worn down by the irritation and pain which to some degree are always present. As the commoner form of prostatitis is usually seen as a complication arising out of gonorrhœa, I may now refer to its treatment. As a rule, if there is much constitutional disturbance, drugs of a special kind are not borne; when the fever subsides a few capsules of sandal-wood oil, or a little copaiba, will generally be found beneficial. There is an old confection I frequently employ for this and like purposes, which can be recommended :—

℞ Pulv. Cubebæ Rec., ℥ij.
Bals. Copaibæ, ʒiv.
Ext. Hyoscyam.
Gum. Camphor. ā ā gr. xxx.
Theriacæ, q. s.

M. Fiat Confect.—A piece as big as a cobnut, to be taken in rice-paper three times a day.—The henbane and camphor combined with the specifics seem to relieve the prostatic spasm and irritability, which is often a prominent feature in these cases. The occurrence of suppuration must be carefully looked for. Where the abscess points to the prostatic urethra it may open spontaneously, and in this way give sudden relief; the passage of a catheter for the retention which sometimes occurs, or even the introduction of the finger in the rectum, may effect the same purpose. After these abscesses have opened into the urethra, it will be necessary to see that they do not close until soundly healed. Like quinsies, they usually heal with rapidity, though in tubercular subjects they sometimes refill, and troublesome internal sinuses remain. Where there is any suspicion of this, the bladder should be washed out daily with iodoform until all signs of pus have disappeared from the urine. When the whole prostate is involved in an abscess, which is readily detectable from the rectum, it is a good practice to make a median incision into it from the perinæum, and provide drainage by a dependent opening. I am not in favour of puncturing prostatic abscesses of any kind through the rectum.

I desire to lay stress, as bearing both upon diagnosis and treatment, on the importance of a thorough examination by the rectum in all cases where there may be ground for suspecting that the prostate is inflamed or suppurating. Pain and tension have often rendered this incomplete, and an error has been the result—an error which would possibly not have arisen had all source of obstacle been removed by the use of an anæsthetic.

A more or less permanent state of dilatation of the follicles, and consequently a fruitful source of chronic discharge — namely, prostatorrhœa — a condition which has been described by Dr. Gross, is an occasional consequence of follicular prostatitis. In the treatment of prostatitis, more especially the subacute forms, care must be taken that pyelitis is not superadded. This is a serious complication, which may remain masked under the primary affection.

Gouty prostatitis, though never terminating in suppuration, so far as I have observed it, occurs in persons who, though having the diathesis, either hereditary or acquired, have previously remained free from the more ordinary attacks of this disorder. Its occurrence is often assigned to catching cold, getting wet, or sitting upon damp seats. Like gout acutely affecting the great toe, the attack usually comes on at night, the patient experiencing severe pain, which he refers to the perinæum, and not unfrequently likens to a hot cork. Though painful, the desire to micturate is irresistible, and is accompanied with spasms, which often render any attempt to retain urine, even while the patient is getting out of bed, almost impossible. Sympathetic pain is at the same time experienced in the groin, or in one or both testicles, rendering the latter extremely sensitive to the touch. Exploration of the rectum with the finger shows the prostate to be both tense and tender. During the day the symptoms generally abate, to recur at night. Like the analogous manifestation in the great toe, these acute prostatic attacks are not usually of long duration, as they merge into a chronic form, which will presently be noticed. The urine is loaded with lithates, and is invariably of an acid and irritating character. After an acute attack the prostate is often left excessively sensitive, and this is a point worthy of special consideration. Following an attack of gout in the foot, the limb is tender, and the person is more or less lame. So with the prostate: it remains sensitive, and the patient dreads to call forth sufficient muscular force to completely empty his bladder. In fact, he lets his urine dribble off voluntarily, and retains a portion of it, so as to form a sort of water-bed behind his prostate. In this way he wards off from his sensitive prostate the last and most painful efforts of each act of micturition. Watch a patient, with a prostate tender from gout, pass water, and the manner in which he cautiously eases off the pressure as the act is about to close is very significant. I have satisfied myself on several occasions that a degree of retention was thus caused by passing a rubber catheter and removing an ounce or so of urine, when it was believed by the patient that he had emptied his bladder.

As acute prostatic gout is usually associated with a highly acid condition of the urine and an excess of urates as well as of uric acid, the administration of alkalies can hardly be regarded other than as a natural expedient. Though, as Sir William Roberts* has pointed out, the experimental evidence relative to the value of alkalies in the treatment of gout is contradictory, there can be no doubt that their use under these circumstances allays the intense vesical irritation better than anything else. Simple diluents for rendering the urine less concentrated are also indicated.

The chronic form of the disorder, where the prostate remains tender for a considerable period, or until it is relieved by treatment, is a far more frequent cause of residual urine than is generally supposed. Occurring, as it often does, at a period of life when hypertrophy of the part usually takes place, the demonstration by the catheter that the bladder does not empty itself is a circumstance which is sometimes acted upon as evidence that the time has arrived when the catheter life should commence. There is this difference, however, between the residual urine of a pouched bladder and that dependent on a prostate which is merely sensitive and temporarily enlarged: the former condition may be benefited by catheterism, whilst the latter is invariably aggravated by it. Where the urine is rendered alkaline in the bladder by circumstances which bring about its decomposition, it is not difficult to understand how a phosphatic stone may be the result. In the view I have urged, relating to another reason for residual urine, is to be found a vesical cause for the collection and aggravation of those materials which the urine of the gouty furnish should a nucleus be provided.

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* *Croonian Lectures*, 1892.

The symptoms of chronic gouty prostatitis may be briefly enumerated as urine habitually loaded with uric acid and urates, unnatural sensitiveness of the prostate to the touch, or even to pressure applied to the perinæal region, and the presence of uncomfortable sensations referred to the neck of the bladder, as if there was a swelling, or the viscus was not emptied, the latter sensation being practically well founded. Persons suffering at times from gouty prostatitis not unfrequently have other indications of this diathesis. An eczema, a contracted theca in the hand, or a tender foot, sometimes afford additional evidence which should not be disregarded.

The treatment of the affection resolves itself into the employment of those general measures appropriate to the gouty diathesis. Iodide of potassium internally, and a mild form of counter-irritation to the perinæum, will generally be found advantageous in removing prostatic tenderness. Lastly, this is a class of disorders which is, as a rule, benefited by some spas, where the diathesis is corrected by suitable diet and waters. Buxton, in England, and Strathpeffer, in Scotland, I have found of very great service; whilst abroad there are many watering-places which such persons may visit with advantage. It is not always easy to recommend suitable drinks for these cases. I have found the Giesshübler Sauerbrunnen a pleasant beverage; as imported into this country I can endorse Dr. Kraus's * recommendation of it as "a very

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* *The Mineral Waters at Carlsbad.*

pleasant and refreshing drink, which invigorates the nervous system, removes acidity of the stomach, gently stimulates the action of the bowels, and causes a copious flow of urine, thus combining the qualities of a good drinking water with those of a mild curative agent." It mixes well with red wine.

Organic stricture of the prostatic urethra, as distinguished from mere compression of the canal by spasm or overgrowth, is extremely rare. I have notes of a well-marked instance in a patient, aged 54, I saw in 1889, where the contraction in this part of the canal was directly traceable to an injury caused by the use of a sound. I have also seen it after lateral lithotomy in association with urinary fistulæ which followed the operation. If gradual dilatation failed to relieve, I should have no hesitation in resorting to an internal urethrotomy, followed by divulsion, and the temporary retention afterwards of a soft catheter.

NINETEENTH LECTURE.

HYPERTROPHY OF THE PROSTATE—VARIETIES OF AND SUGGESTIONS AS TO ITS CAUSE.

It is stated by Sir Henry Thompson* "that actual hypertrophy of the prostate exists in about 34 per cent. of men at and above sixty years of age, and that it produces manifest symptoms in about 15 or 16 per cent." I am rather disposed to think these figures somewhat underestimate the frequency that this alteration is met with. Not long ago I took opportunities to examine consecutively one hundred males who had reached their sixtieth year or upwards, and it appeared, by investigation from the rectum, that out of this number about three-fourths presented indications of this change, though not a fifth of those thus affected had a sufficient cause for complaint. It must, however, be remembered that my calculation was drawn from the living under circumstances where I was open to fallacies such as would not be likely to occur in the actual specimens from which Sir Henry Thompson's careful data appertaining to this point were derived. Without the assistance of figures it is sufficiently clear that as males approach the age of sixty the prostate is extremely liable to become enlarged, and that this enlargement may become a serious source of inconvenience and disease, though the latter consequences need not necessarily happen. I have watched many men with well-marked signs of an enlarged prostate for a number of years, and up to the time of their deaths, either by

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* *Diseases of the Prostate.*

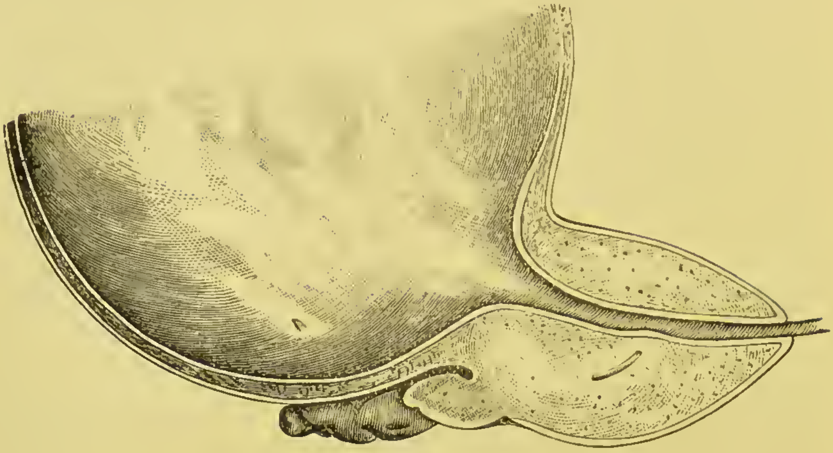

Fig. 47.

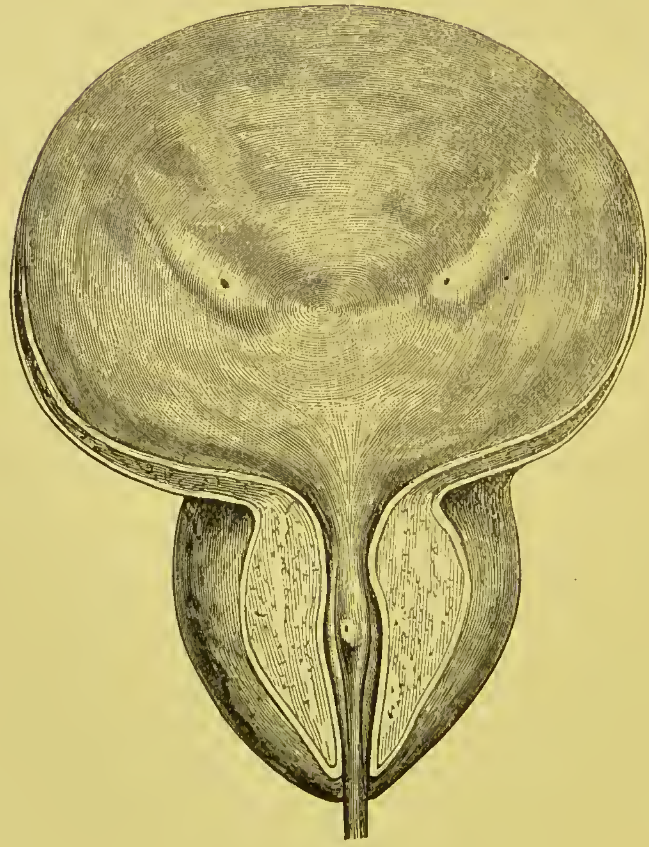

Fig. 48.

natural decay or from other ailments, without knowing them to be conscious of any kind of weakness so far as their urinary organs were concerned. But though persons may, either by good care or good fortune, obtain an immunity from those troubles which prostatic enlargement not unfrequently brings with it, there can be no doubt that they carry with them to the end of their lives the liability to suffer in ways which do not apply to those who are not undergoing this structural change, a liability which may show itself without notice or warning. The freedom from symptoms, as well as their kind and degree, should they supervene, is, I

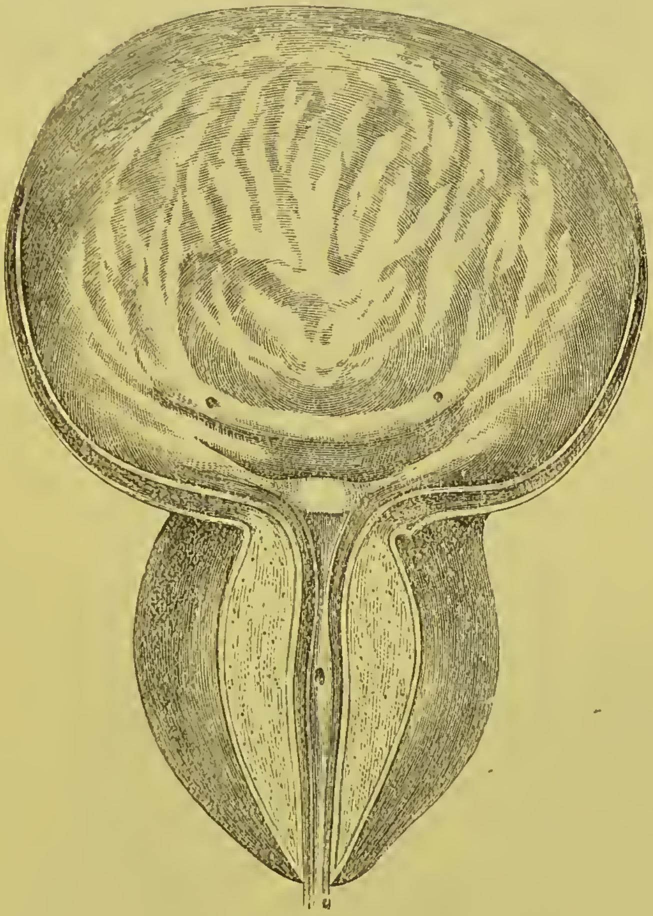

Fig. 49.

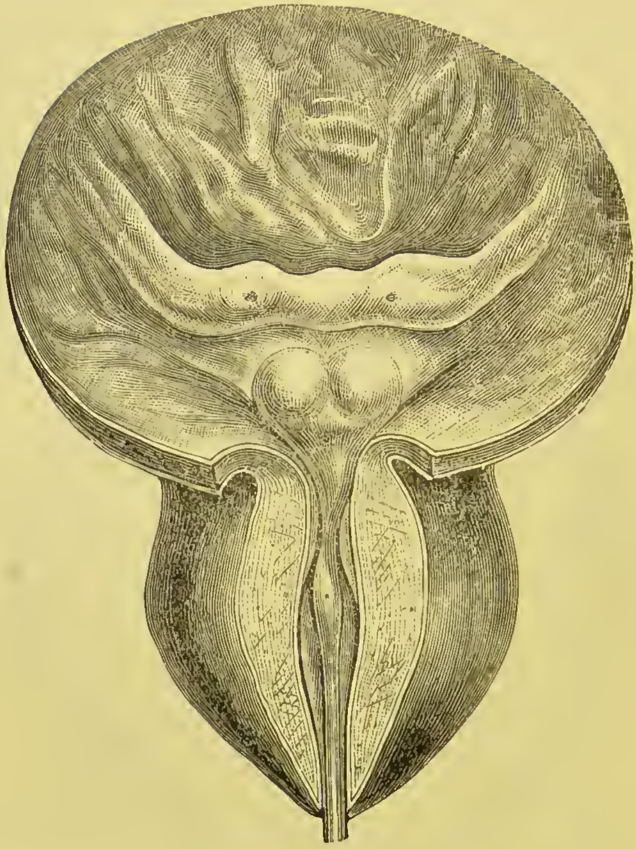

Fig. 50.

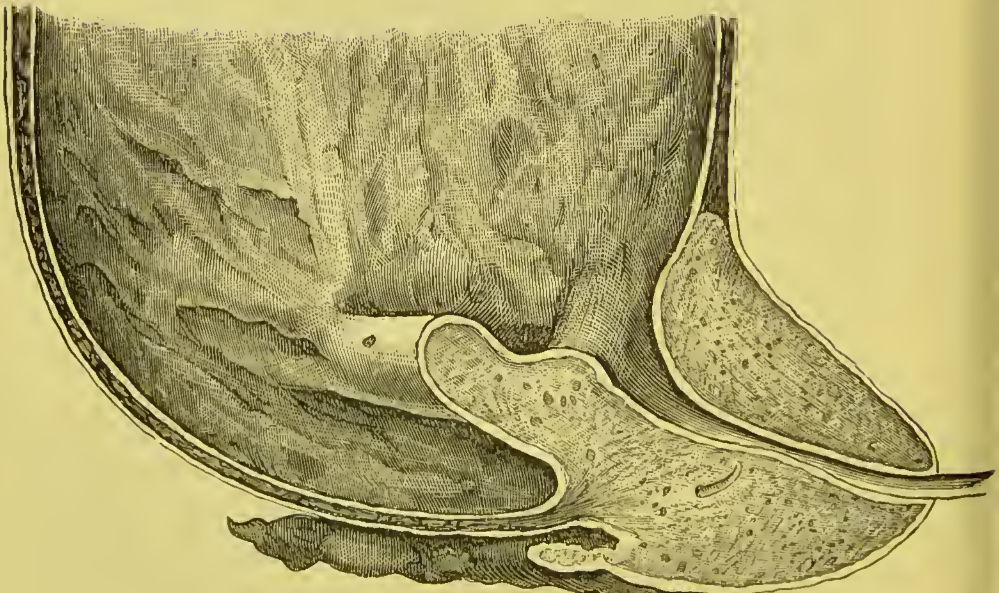

Fig. 51.

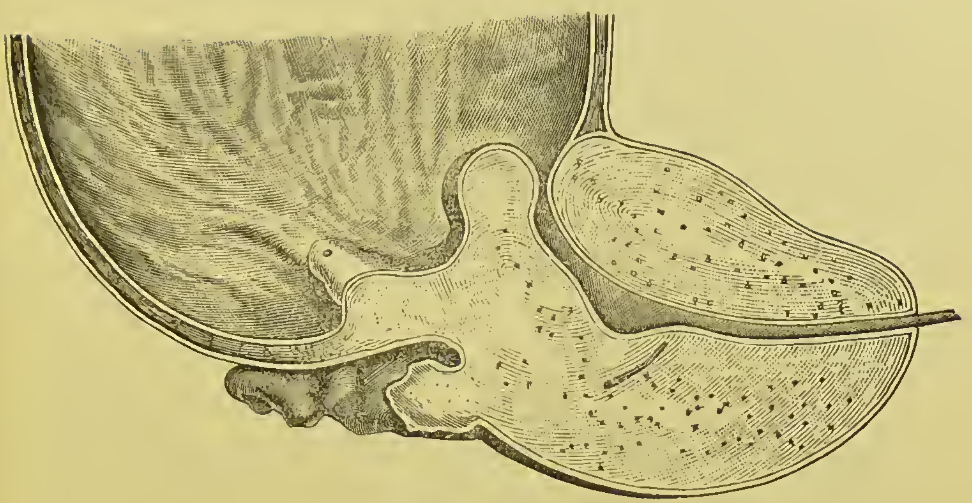

Fig. 52.

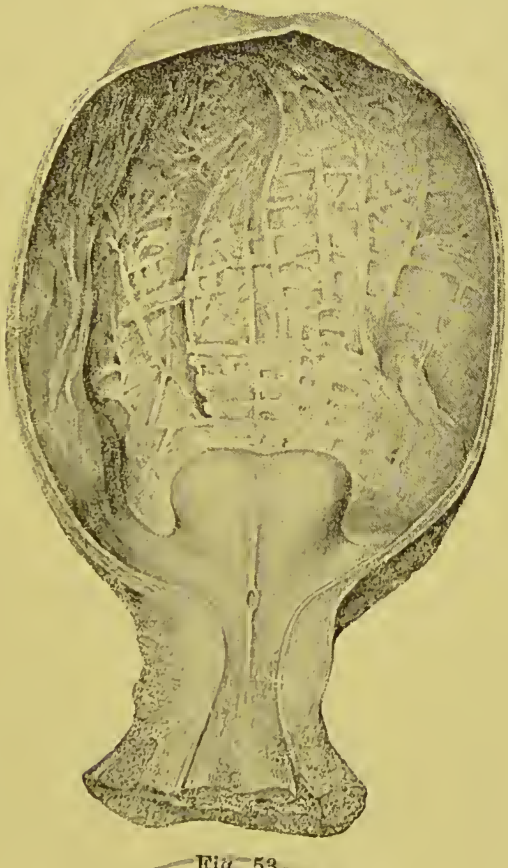

Fig. 53.

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BATH

believe, largely determined by the form the enlargement takes, and the relation it holds with the bladder. Great variety will be found in these respects, as will be gathered from an examination of some of these drawings. Figures 47 and 48, though showing the prostate to be somewhat enlarged, do not indicate that either the outlet (Fig. 48) or the floor (Fig. 47) of the bladder have undergone very material alteration in form beyond some depression or tendency to pouching of the posterior wall, which is not uncommon in all specimens of this kind, and which will be again referred to. These changes in shape are better recognised after death, before the parts are removed from the body.

Figures 49 and 50 show the progressive development of strong muscular barriers in conjunction with the growth of the prostate, one in particular passing transversely across the bladder and dividing it into two unequal compartments, and which is known by the name of the inter-ureteral bar.

In Fig. 51 we have illustrated the inter-ureteral bar in section, and the pouch found in connection with it in which urine or stones may lodge and keep up irritation.

Figures 52 and 53 not only repeat what has already been illustrated, but further show how the prostatic growth may encroach on the cavity of the bladder and cause irritation and cystitis.

It would be easy and instructive to illustrate many more varieties of the forms that prostatic hypertrophy assumes. These are, however, sufficient to indicate that the symptoms connected with this disorder are equally various. Some forms are, as I have already said, comparatively harmless, whilst others are liable to lead to much discomfort.

The causes of hypertrophy of the prostate have formed subjects for much speculation. Diet, exercises, and occupations of various kinds, modes of living, abstinence and indulgence, sexual habits, gout and rheumatism, have all in their turn been discussed as being either direct or contributory causes, but without sufficient evidence being adduced to warrant any definite conclusions being arrived at in respect to any of them. I have long felt that the solution of the question would probably turn on a fuller recognition of the function of the parts involved, and that thus the urinary apparatus might furnish another instance of a compensating contrivance to meet exigencies arising out of structural deteriorations. If enlargement of the prostate does not serve some useful purpose, it is difficult to understand why so large a proportion of persons who have assumed this condition by a gradual and painless process should not be inconvenienced by it, and why we should draw our conclusions as to the process being a morbid one from the minority of instances of it rather than the majority. It seems more rational to search for an explanation of the growth in connection with the natural usages of the part rather than amongst such extraneous circumstances as those I have already enumerated. If we had confined our inquiries, for instance, in the case of the hypertrophied heart to such directions, the pathology of many points connected with the circulating system would not have made the great progress it has. It is suggested that we have not sufficiently recognised the use of the prostate as a muscular support—primarily, to the bladder and its contents, and, secondarily, to the adjacent parts—a support which, in the event of muscular tissue failing, must be supplemented by other means and other tissue. The failure to appreciate more fully this function is probably in a measure due to taking our ideas of the disposition of the living prostate from the condition it presents after death, when removed from the body, in a more or less contracted state, somewhat resembling a chestnut in shape. During life it assumes no such appearance, except when the bladder is absolutely empty; on the contrary, the muscular fibres of which it is so largely composed are spread out like a funnel, so as to furnish a muscular support for the bladder as well as its varying contents. This disposition is probably best appreciated by examination by the rectum when the patient is in the erect position with the bladder empty, as well as in various degrees of fulness.

In investigating the bladder, both during life and after death, it is impossible not to be struck with the altered relations which frequently exist between the viscus itself and its neck or outlet. In early adult life the bladder may be regarded as an abdominal rather than a pelvic organ; as years advance it gradually sinks within the pelvis, whilst still later on it will often be found to have become further depressed within the pelvic cavity. In this way I have seen a prominence given to the floor of the prostate which was due, not to the development of more prostatic tissue, but to the sinking of the posterior wall of the bladder. When it is considered that the prostate is almost immovably fixed by ligament in its position, whilst the bladder can rise or fall according to circumstances, it is not difficult to understand how this can be, and how an obstacle may be put in the way of micturition which does not necessarily involve an increase in the amount of prostatic tissue. This mode of forming a prostatic bar may be readily imitated. The trigone, or floor of the bladder, in addition to being a highly sensitive part, is peculiar in that it contains but few muscular fibres in its composition; muscle in abundance may be found as low as a line corresponding with the openings of the ureters, and marking the superior boundary of the trigone, and below in the prostate; between these two points the power of muscular contraction can hardly be said to exist. Assuming that from any cause, such as long retention of urine, habit, position of the body, or the weakness connected with advancing years, the floor of the bladder sinks lower within the pelvis relatively to the prostate, so as to offer some difficulty in expelling the least portion of the urine, the effect will be frequently-repeated efforts in all the muscles immediately adjacent to a part of the bladder which, by reason of its connections and structure, has but little power of contracting. This will eventually lead, as I have endeavoured to show,* to the development of a strong muscular buttress between the orifice of the ureters, and also, I believe, to similar changes in the muscular tissue so largely entering into the prostate, and principally affecting its posterior segment.

In examining such specimens of bladders (Figs. 47, 48, 49, 50, 51, 52, 53) as are figured here, it is hardly possible not to recognise the fact, whatever the explanation may be, that for some reason or other there is a concentration of natural tissue in the form of buttresses about the perpendicular axis of urine pressure at the base. This is seen in the development of the inter-ureteral bar, the growth of the prostate, the gradual approximation of these two structures as shown more particularly in Figs. 49 and 50, and the restriction of the natural trigonal area. It is suggested that in this way quantity is substituted for quality, and that as age advances, structural deterioration is thus provided against. In some criticisms which the publication of these views called forth on a former occasion, it appeared to me that the twofold requirements of the bladder, so far as muscular action was concerned, were hardly sufficiently distinguished. The action of constant support to a reservoir not of stationary but of ever-varying dimensions is perfectly distinct from that force which is merely engaged in the occasional work of emptying the viscus of its contents. The one action mainly engages the base, whilst the other involves the apex and sides of the reservoir chiefly. When hypertrophy occurs in connection with the former it is to be found in the base of the bladder, whilst with the latter it is to be expected in the walls.

It may be urged that, though some cases of enlarged prostate appear capable of explanation on the ground that they are essentially hypertrophies in the usual acceptation of the term, there are others where such an explanation is not so apparent. In the latter category reference no doubt will be made to those instances where the prostatic mass is made up of more or less lobulated projections (Fig. 53). These I would speak of as the upheavings of a frequently contracting muscular ring. In a muscle or part undergoing hypertrophic growth, and where the process is prompted by circumstances which are obviously liable to some degree of variation, tissue production may be excessive or become unnecessary. Such excess would naturally tend, under the contraction of the part, not only to protrude itself where the resistance was least, but to assume a more lowly organised form than that originally produced. In this way, I believe, these masses of more or less degenerated prostate tissue are formed; and just as there is a wide difference between the irritability of the bladder associated with the initial stage of the hypertrophying prostate and that caused by the fibrous projections of the gland just referred to, which produce symptoms quite as irritating to the bladder as any stone, so is there a corresponding difference in the residual urine which accompanies each of these states.

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* "On Some Changes in Form of the Prostate and Floor of the Bladder." *Liverpool Med.-Chir. Journal*, July, 1885.

The male bladder, in its structural arrangement and requirements, has little in common with that of the female. In the former the mechanism of micturition, the axis of urine pressure relative to the pelvic outlet, and co-ordinating provision for the ejaculation of the semen, are points amongst others which would render any comparison impossible from the standpoint which led to the introduction of the preceding remarks. The manner, for instance, in which the bladder is supported when distended in the female has a resemblance approaching to what is found in some quadrupeds.

TWENTIETH LECTURE.

Forms of Prostatic Obstruction.

Persons with enlargement of the prostate seldom seek professional assistance unless it leads to some alteration connected with the act of micturition. Irritability of the bladder is an early and frequent symptom of this change, and, in the case of a man advancing in years, is sufficient to suggest that the prostate is causing it. Examination by the rectum, as I have described in a preceding lecture, will usually determine this. In some cases where there is any urgency, as for instance retention of urine, the introduction of the catheter may also be necessary; but this expedient, particularly in elderly persons, should not be undertaken without due consideration. Because, for example, a person has, in connection with enlargement of the prostate, some degree of residual urine, this by no means implies that he will be the better for its artificial removal.

Before discussing details of this kind it will be convenient to classify the circumstances under which prostatic enlargement as a disorder of the urinary apparatus presents itself to our notice. The following arrangement seems to respond to what we meet with in practice:—(1) Irritable bladder connected with the earlier forms of prostatic obstruction. (2) Obstructing prostates with more or less residual urine and atony of the bladder. (3) Sudden and complete retention of urine with obstructing prostate. (4) Advanced forms of prostatic obstruction with inflammation of the bladder.

(5) Enlarged prostate complicated with stone or tumour in the bladder. The latter will be reserved for consideration with these respective complications.

1. *Irritable bladder connected with the earlier forms of prostatic obstruction.*—This is a common symptom, and may denote imperfect powers of emptying the bladder. The irritability is not uncommonly, as stated in the Fifteenth Lecture, traceable to some mechanical cause, acting through the enlargement, as it often follows various kinds of movements. The morning and evening increases in frequency are evidently connected with the change from the perpendicular to the horizontal position, and *vice versa*. In this respect there is something resembling what happens in the case of persons with elongated uvulas, where much irritability of the larynx, with coughing, immediately follows on the patient assuming the recumbent form. In a like manner, the greatly increased excretion of urine during the night may, in some instances, be explained by a mechanical cause inducing a reflected action.

Persons with large prostates are liable to occasional attacks of congestive hæmorrhage from the bladder, which seem to be excited by slight causes, such as exposure to cold and the fatigue incident to long standing or walking. As a rule, it is a mere temporary annoyance, which need neither occasion alarm nor call for too active treatment for its suppression. Rest, warmth, mild laxatives, and a little patience, will generally be found sufficient to bring about a cure. The bleeding usually comes from the veins of the bladder, which are often in a varicose or dilated condition. This form of hæmorrhage must not be mistaken for that which may be caused, in conjunction with irritability, by the movements of a stone in the bladder. Various pains and sensations, principally in the back, the nates, and down the thighs, are sometimes caused by the pressure of large prostates, and by frequent and prolonged efforts to micturate. I have noted these symptoms in persons who had no other reasons for coming to such a conclusion, yet examination by the rectum proved them to have prostates of exceptional size. Others are irritated sexually by their prostates, and annoyance in this way is occasioned. The late Dr. Christopher Johnston,* of Baltimore, records a case where a man, aged sixty-two, was charged with abandoning his wife and resorting to incestuous connection :—

> " The defence, while admitting as a fact that the man and the girls had shared the same bed, denied that the sexual act had ever been performed ; and insisted that the accused could never have effected penetration, because he was at the time, and had a long time before been, the subject of enlarged prostate, and it was claimed by counsel that the prostatic enlargement was a bar to the sexual act, for the reason that it occasioned such pressure on the erectores penis as to draw the male organ downward and render coitus impossible."

This line of defence, however, was clearly untenable.

Some years ago I drew attention † to the advantage following the use of a suitable bougie on the appearance of indications such as I have just referred to, that the enlarging prostate was encroaching upon the urethra and tending to obstruct it. I did so because I had observed instances, and had examined them after death, where, though there was considerable hypertrophy, no obvious obstruction existed, as provision was made for the escape of the urine in channels or grooves which had been formed in the growing tissue. This process of conservation appeared capable of artificial production for a useful purpose. With this object I instructed patients in whom this liability to obstruction seemed to exist to habituate themselves to the occasional passage of a soft bougie, in preference to a catheter, unless the latter was absolutely required. The instrument which I devised, and which has served the purpose very well in varying stages, is shown in Fig. 54. I do not, however, commit myself to an absolute form or make, as I am in the habit of saying that the bougie which enters the bladder most easily is the best for this purpose. Bladders, as age advances, become atonic or powerless, partly because of prostatic obstruction, and partly by reason of structural deteriorations and diminished powers of accommodation which, in principle, is by no means limited to the mechanical processes connected with the organs of micturition. It is no more remarkable to find that the bladder requires some assistance as we approach sixty years of age, than to be conscious that our eyes require spectacles. To say that assistance is not to be rendered to a bladder which is evidently labouring to overcome an obstacle in front of it, in the shape of an obstructing prostate, is a statement which seems to be at variance with common sense.

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* *The Hypertrophied Prostate Gland from a Medico-Legal point of View.* Pamphlet (with numerous references). Baltimore, 1883.

† *The Prevention of Stricture and Prostatic Obstruction*, Churchill, 1881.

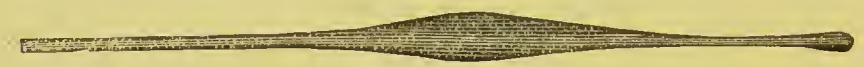

Fig. 54.

Let me illustrate the kind of cases and treatment I am now referring to:—

Case I.—It was that of an elderly gentleman who, in the belief that he had an enlarging prostate, took means which proved successful to prevent the occurrence of retention of urine. Long before I knew him, he was told by a surgeon that his slight urinary troubles were the early indications of an enlarged prostate, and that sudden retention of urine was not an improbable consequence. This so alarmed him that up to within a short time of his death (which was from other causes) he never allowed a day to go by without passing a full-sized gum-elastic bougie for himself. He remained quite free from any urinary inconvenience, a circumstance which he attributed to the means he adopted. I made a *post-mortem* examination, and found that, though the middle lobe of his prostate was considerably enlarged, the level and patency of the prostatic urethra were in no way altered, the growth or enlargement being, as it were, deeply bisected by the new canal, as represented in the accompanying figure (Fig. 55). It appeared to me, to use the phrase of my patient, that "the maintenance of the water-way" was directly traceable to the persistent catheterism employed.

Case II.—In 1881, a gentleman, 60 years of age, consulted me for an irritable bladder.* Not only was there unnatural frequency in passing urine, but the act had lost its natural characteristics, for instead of the urine being expelled in a stream, it seemed rather to ooze from the penis. Though an examination from the rectum revealed but little amiss with the prostate, further investigation determined that there was a considerable obstruction within the prostatic urethra, and that the bladder was beginning to lose its power. Under these circumstances, I advised the patient to introduce a soft instrument into his bladder daily until further instructed. In the course of three months he was practically well, and, beyond passing his instrument occasionally for his own satisfaction, he has remained so.

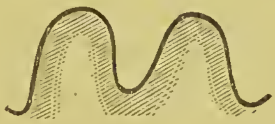

Fig. 55.

In an experience of this kind, which has not been inconsiderable, I think I may say that where there exists any mechanical obstruction, however slight, to the escape of urine along the urethra from the bladder, I have never known any harm arise when an instrument adapted to the particular case has been selected and is properly used. Where this has not been complied with, it is not remarkable that the results should be disappointing.

In advising persons who have reason to believe that they are suffering from the earlier symptoms of this affection, I have been in the habit of laying stress upon the following points:—(1) To avoid being placed under circumstances where the bladder cannot be emptied at will. (2) To avoid checking perspiration by exposure to cold, and thus throwing additional work on the kidneys. In climates such as our own, elderly persons should, both in summer and winter, wear flannel next to the skin. (3) To be sparing of wines, or of spirits exercising a marked diuretic effect either by their quantity or their quality. Preference should be given to those which promote digestion without palpably affecting the urinary organs. A glass of hot gin-and-water, or a dose of sweet spirits of nitre, will not remove the residual urine from behind an enlarged prostate. (4) To be tolerably constant in the quantity of fluids daily consumed. As we grow older our urinary organs become less capable of adapting themselves to extreme variations in excretion. We should therefore endeavour to keep to the average consumption of fluids which experience shows to be sufficient and necessary. When more fluid than usual is consumed it is often followed by distension of a bladder long hovering between competency and incompetency, and the retention thus caused, by suspending the power of the viscus, has frequently been the first direct step towards establishing a permanent, if not a fatal, condition of atony or paralysis of this organ. (5) It is important that from time to time the reaction of the urine should be noted. When it becomes permanently alkaline, or is offensive to the smell, both necessity and comfort indicate the use of the catheter. If practicable, the patient may be instructed in the use of this instrument. Persons with enlargement of the prostate should be particularly careful in avoiding constipation. (6) Some regularity as to the time of performing micturition should be inculcated. We recognise the importance of this in securing a regular and healthy action of the bowels, and though the conditions are not precisely analogous, yet a corresponding advantage will be derived from carrying out the same principle in regard to micturition. The sum of these instructions is, that as we cannot arrest the changes by which the prostate becomes an obstacle to micturition, it is of the first importance that every means should be taken to compensate for this by promoting the muscularity of the bladder and preventing it becoming atrophied or paralysed either by accident or improper usage.

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* *Lancet*, Jan. 16, 1886.

As to the use of drugs in the treatment of the early form of prostatic obstruction, there is not very much to be said. The late Dr. Atlee,* of Philadelphia, believed in the efficacy of ergot of rye in effecting a reduction in the size of the enlargement. I have tried it, and conclude that any good results following are to be attributed to its promoting the muscular action of the bladder, which it certainly does. Dr. Beverly, of Norwich, who has charge of an institution for elderly men, told me that he found much benefit from small doses of the perchloride of mercury administered for some time. Where the irritability is not due to residual urine, as is often the case, I have noticed relief from iodoform and cocaine suppositories. Five grains of the former, with half of the latter, introduced into the rectum at night will generally procure rest. Opium, by constipating the bowels, is not to be desired. Many persons are benefited by washing out the rectum once a day with a copious enema. Where laxatives are required, a sulphur lozenge at bed-time, or a dose of an electuary composed of equal parts of the confections of pepper, sulphur, and senna, will usually be found effective. In other cases the old-fashioned *Baume de vie*, or compound decoction of aloes, answers well. Scybalæ in the rectum by their pressure can cause, as well as aggravate, retention of urine. Where there is much bladder spasm, either with or independent of catheterism, opium or morphia may be absolutely necessary. For the same purpose I have seen subcutaneous injections of cocaine above the pubes, in half-grain doses and upwards, give a night's respite from such spasmodic sensations when other measures had failed. In that form of irritability, attended with an inordinate discharge of tolerably healthy urine, particularly at night, the bromide of ammonium is of much service in limiting the frequency caused by an excess promoted by reflex action.

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* *Diseases of the Urinary Organs* (quoted). Dr. S. D. Gross.

The neurotic hypertrophied prostate is occasionally met with as a remote consequence of unnatural and prolonged excitations or usages of the sexual act. The part is rendered preternaturally sensitive to impressions of all kinds, and it shows this in different ways, sometimes as causing irritability of the bladder, whilst in others in connection with prostatorrhœa. Complicated with conditions necessitating some mechanical treatment, such as catheterism for retention of urine, or for washing out the bladder, as in instances of cystitis with offensive or septic residual urine, the difficulties in the way of the practitioner are very great, as the gentlest manipulations are rendered absolutely intolerable, whilst at the same time the other local complaints rapidly make headway. Hot sitz baths, containing sedatives such as infusion of hops, or of poppy-heads, or a solution of the *Sal des Pennes*, with the sterilisation and neutralisation of the urine from within, and the use of cocaine locally should the catheter be unavoidably necessary, are the most reliable means when the symptoms are pressing. During periods of comparative repose or convalescence, such forms of neuralgic sensitiveness are best treated by the use of various douche baths such as are employed in Bath, Aix-les-Bains, and resorts of this kind. Persons suffering from irritability of the bladder connected with prostatic enlargement invariably require good nutritious food, frequently administered, in the shape of purées of meat, eggs, milk, or good wine or whisky. The diet should be so arranged as to favour the regular action of the bowels, without unnecessarily resorting to aperient medicine.

2. *Cases of obstructing prostates with more or less residual urine and atony of the bladder.*—Under this heading I do not include instances of paralysed or ataxic bladders, where muscular power to expel is the sole mechanism at fault. I will therefore proceed to those cases where, by reason of altered structural relations between the bladder and the prostate, completed micturition is rendered impossible. This must naturally be expected in a reservoir where the outlet is considerably above the level of the most dependent portion of the fluid that has to be discharged. Hence it is hardly right to speak of this inability as atony or want of power, when the physical conditions connected with the upward growth of the prostate, as shown in Fig. 52, are such as to render efforts of this kind inert, though in the process of time this structural change may necessarily follow. Because an elderly man leaves in his bladder a certain amount of urine after he has done his best to completely evacuate it by his natural efforts, this by no means implies that he is the worse for it. Sir William Savory* has pointed out that the decomposition of the urine does not necessarily follow. If, however, the individual suffers in any way which is directly connected with the prostatic enlargement, then the question of the artificial removal of the residuum becomes an important one.

It may be generally stated that residual urine is, under the circumstances we are discussing, a necessary consequence of an alteration in shape of the bladder, and can only be regarded as obnoxious to it either by the quantity of urine being excessive or inconvenient, or the quality being deteriorated and irritating. Either of these conditions may not only call for, but demand, the removal of the urine if the life of the individual is to be continued upon any terms. Hence we have to consider how this artificial process of micturition is to be brought about with the least amount of inconvenience to the patient. I am of course assuming that everything in the way of general treatment and medicine has been tried up to that point where tentative measures may be safely continued.

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* "On the Relation of Partial Retention of Urine to its Decomposition in the Bladder." *Lancet*, Oct. 14, 1882.

In refraining from the adoption of other artificial aids, such as catheterism, we must be certain that the existing pressure of residual urine, not unhealthy in its character, on the parts above is not likely to be either immediately or remotely injurious to them. That in this way much damage may be done which might, by a little mechanical aid at the proper time and by suitable means, have been prevented, there can be no doubt. The dilated and permanently damaged condition of the bladder, ureters, and kidneys often affords evidence of this. Where this exists, in conjunction with the intercurrence of chronic inflammation from the kidneys downwards, which long-continued back-pressure has insidiously brought about, the simple act of catheterism then becomes magnified into an important operation, and a proceeding which at one time would have been protective, now has an element of risk imported into it. It is under the latter circumstances that the catheter gets the blame rather than the uræmia, which was the logical sequence of unaided, but slowly progressive, obstruction. A low specific gravity of the urine is a constant concomitant of such a condition as this. When, therefore, we have reason to believe that residual urine in connection with prostatic enlargement is, either by its quantity or quality, a source of irritation to the patient, we may proceed to the adoption of an artificial expedient for its removal. This irritation may show itself in a variety of ways. In some it is evidently due to the ammoniacal odour the decomposing residuum exhales; in others, by the continual desire to micturate after the act is supposed to have been accomplished; whilst in a few the annoyance takes the form of a constantly overflowing reservoir, which saturates the garments, and renders the individual an annoyance to his neighbours. In selecting a catheter for this purpose, one of the softer kinds is preferable; the rubber instruments introduced by Mr. Hutchinson are excellent, and so are the flexible silk web ones. The coude, or French catheter, where the end is fixed at a suitable angle, is a useful instrument (Fig. 56).

It is important that the delivery power of a catheter should be relative to the normal size of the urethra, as I have remarked upon in my Sixth Lecture. The amount of residual urine is occasionally considerable. In some instances, the bladder has become so atonied and distended, that practitioners have thought at first sight they were treating ascites instead of urinary retention. We must always be on the alert for contingencies of this sort in cases of central abdominal protuberances. This suggests the question, Is it desirable in cases where there is a large collection of urine in an atonied bladder to remove it entirely? I believe, as a rule, this is not a good practice, for it implies that a paralysed bladder should at once assume normal dimensions though the distension may have been in existence for days or even weeks. When a chronically distended bladder is suddenly emptied, passive hæmorrhage sometimes occurs; further, there is always some risk of the viscus becoming septic, and a low form of fever, with dry brown tongue, supervening, upon this comparatively simple operation. It is better, where practicable, to empty a distended atonied

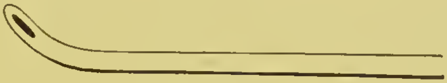

Fig. 56.

bladder by degrees, and after each operation to put in a residuum of some antiseptic fluid, such as a solution of boracic acid or corrosive sublimate (1–10,000). Where an atonied bladder with great distension is complicated with a large prostate, which renders catheterism difficult, I should, notwithstanding objections that have been urged against it, recommend the use of the aspirator with a fine needle. I have seen this answer well, the urine has been removed by degrees, and patients have eventually gained the use of their bladders. This method has much to commend it under these circumstances, regardless of the possibility or not of passing a catheter by the natural way. I cannot recall an instance where I have ever seen catheter fever, as it is called, follow the emptying of the bladder with the aspirator. When a largely distended atonic bladder has been relieved by catheterism, I have found much benefit from immediately putting a pad over the bladder, and securing it with a bandage or belt, as after parturition. An abdominal belt should always be worn. Dyspeptic symptoms and distension of the abdomen by flatulence often follow when residual urine is first drawn off systematically, and furnishes another reason why persons should be carefully looked after when they are undergoing a change of this kind. By rest, the use of antiseptics, and the adoption of such precautions as a prudent surgeon takes in removing fluid from any locality within the body, the introduction to catheter life, or the complete restoration of the natural function of the bladder, may be accomplished with immediate comfort to the patient, and without exposure to those risks which might otherwise follow. I need hardly remark that these points have been more fully recognised in practice since Sir Andrew Clark drew attention to the subject of catheter fever. The fact that the bladder may become atonied must not be lost sight of in the management of persons suffering from debilitating illnesses and various forms of cerebral softening.

3. *Sudden and complete retention of urine with obstructing prostate.*—Our services under these circumstances are usually called into request with some urgency. Either we are already acquainted with the liability of the patient to suffer in this way, and are consequently prepared for the cause, or from the age of the man our suspicions are aroused as to the nature of the obstruction. I will presume that such catheters as are referred to in the previous section have been tried, but without avail, and retention of urine from an obstructing prostate is urgent. When this is the case I usually employ a No. 8 English gum-elastic catheter, with a wire stylet, as it is necessary that the surgeon should be able to give some direction to his instrument, guided, perhaps, by the introduction of the finger into the rectum. A catheter suitable for an ordinary case of retention may prove too short for this purpose, and it is therefore well to be provided with longer instruments. The long metal prostatic catheters are dangerous instruments, and are seldom required; I can only recall two instances in my own practice where I had occasion to use them.

I have found the whip-bougie, described in the Fourth Lecture, over which is slipped a silk catheter, open at the end and side, very serviceable when the prostatic urethra is at all tortuous or lobulated. In the selection of instruments for cases of prostatic retention, remember, as a rule, that the best catheter is that which goes in easiest to the patient. It is impossible to examine a number of specimens of enlarged prostates without recognising the fact that no one instrument or shape can be of universal application, however skilful the operator may be. He will prove himself the most successful practitioner who appreciates these distinctions and shapes his course accordingly.

Provision, however, must be made under this heading for those cases of acute prostatic retention where catheterism is found impossible. Instances of this kind are rarer than they used to be by reason of the improvement that has taken place in urethral instruments of all kinds. Still, cases of obstruction, both to the expulsion of urine from the bladder and to the passage of instruments, will arise. Under these circumstances, I think there is nothing better or safer than the aspirator needle introduced into the bladder immediately above the pubes; the urine is at once drawn off, the patient obtains complete relief, spasm subsides, and in the course of a few hours the instrument that failed passes along the urethra into the bladder without meeting with serious impediment. If, however, catheterism fails, the aspirator may be introduced with impunity again and again. As a rule, I am not in favour of tying an instrument into the bladder along the urethra unless the difficulty of entrance is extreme, or the irritability great, and then it may be resorted to as a temporary expedient. When the surgeon or the patient can pass the catheter, this is to be recommended.

When a catheter has to be tied in, it is best secured by a piece of thick silk thread knotted round the instrument, and held in position by a strip of adhesive soap plaister wound round the penis, and covered with a narrow bandage. It should drain continuously into a urine bottle between the patient's thighs. Tying in a catheter by attaching it to a ring over the penis, or to the pubic hair, are objectionable methods, simply because they are extremely uncomfortable. In old men, where the penis is much atrophied, it is a good plan to put on a comfortable suspensory bandage, and to attach the thread or narrow tape holding the catheter to the sides of the opening through which the penis passes. In selecting soft catheters to tie in, the openings should be close to the end of the instrument.

I have had made,* for use with the whip-bougie, some silk catheters, open at the sides as well as at the end, which are fitted with eyelets, so that they may be easily tied in when this expedient may become necessary (Fig. 57). For a similar purpose various forms of winged or self-retaining catheters (Figs. 58, 59) have from time to time been suggested and used. As they are not easily introduced in

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* By Mr. Wood, 81 Church Street, Liverpool.

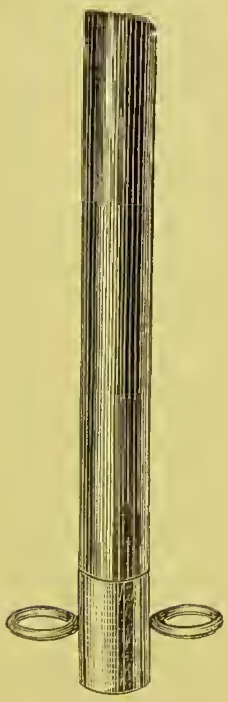

Fig. 57.

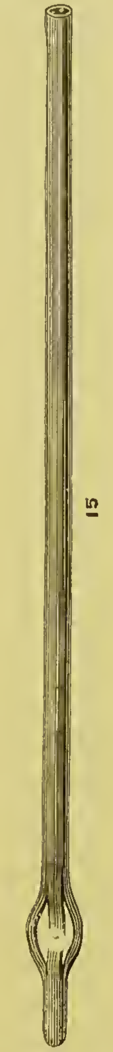

Fig. 58.

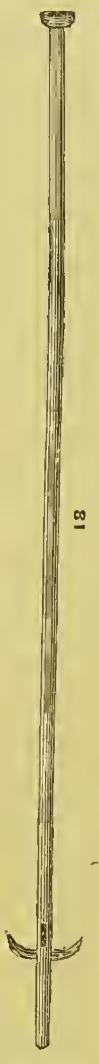

Fig. 59.

difficult cases of prostatic obstruction, whilst in others they seem to provoke irritation rather than to soothe, their application will be found extremely limited. Puncture of the bladder by the rectum may now be regarded as an obsolete operation.

After the sudden retention due to an enlarged prostate has been relieved, the important question arises as to the future of the case—What are the patient's prospects so far as the power of the bladder is concerned? Is he to look forward from this occasion to the continuance of what has been spoken of as catheter life, or is there a reasonable hope of the bladder resuming its natural function? To answer this we must have regard to (1) the patient's antecedents; (2) the circumstances which induced the enlarged prostate suddenly to close the exit from the bladder; and, (3) the evidence as to the state of the prostate which is afforded by digital examination from the rectum.

First, as regards the patient's antecedents. What has happened before may happen again, *cæteris paribus,* and the inference is that if a patient has suffered in like manner and regained his power of micturition he will do so again. In the second place, the determining cause of the retention may to some extent assist us. If a patient can satisfactorily trace his retention to some temporary cause acting upon his enlarged prostate, such as cold, indulgence in drink, or neglect of the calls of nature, it is probable, having regard to the third consideration, that with the removal, or subsidence of the cause, the power of micturition will again return. I, however, would lay stress on the examination of the prostate from the rectum as largely influencing our views in reference to the patient's future. When retention occurs in a person with a hard nodulated prostate, where there is evidence to the touch that fibrous tissue predominates largely over the muscular, the power of the bladder seldom returns, and the use of the catheter is generally perpetual; when, on the other hand, the prostate is found soft and yielding to the touch, indicating that muscle is there, we may, as a rule, anticipate the restoration of function.

Before concluding, I will make a few remarks on self-catheterism, for if the issue of a case of sudden retention is such as to render the use of the instrument more or less continuous, then it becomes the duty of the surgeon to instruct the patient in that act, so that not only may he provide against contingencies, but be able to meet the requirements of his daily life. Some persons who employ self-catheterism use the soft, flexible silk and rubber instruments; whilst others prefer those with a little more resistance, such as the gum-elastic and French catheters.

In the selection of an instrument our object should be to obtain one that passes readily, but, at the same time, fulfils conditions as to size and pressure on the surrounding parts of which a medical practitioner is alone capable of judging. Cases of this kind should not be handed over to the instrument maker indiscriminately, any more than persons requiring trusses, spectacles, and other mechanical contrivances. As with the instrument, so with the position of a patient who has to practise self-catheterism: most individuals discover for themselves the readiest posture; one person finds he can only empty his bladder completely when standing up; another, that his large prostate offers less obstacle to the catheter as it is entering the bladder when he is recumbent; whereas a third concludes from experience that the introduction of the instrument along the canal, and the withdrawal of the urine, is accomplished with the fullest degree of satisfaction to himself in all these respects when he is seated at the edge of a chair or a couch, with his various contrivances in the way of vessels and lubricant ready at hand.

With patients who have to practise self-catheterism it is well to instruct them to withdraw the instrument very gradually as the flow ceases. In this way pockets and canals about the prostate are emptied of urine and mucous which would otherwise keep up a sensation as if micturition was incompleted. In some instances, where there was a saccule with a small orifice, permanent benefit has followed the daily drainage of it, by the patient, when the bladder is presumed to have been emptied, assuming the recumbent position and turning over on his side so as to make the abdomen dependent. In most cases of pouched bladder the syphon action of a soft catheter is in itself sufficient to effect this, provided the instrument is slowly removed.

Much that I have said in reference to the selection of instruments and a suitable position applies also to the frequency with which the operation of self-catheterism should be employed. A man who cannot empty his bladder to any degree spontaneously, and is dependent upon his catheter, must be careful in imitating as far as possible the calls of nature; this, of course, is to a certain extent a relative term permitting of no further refinements. In other instances, where persons void a portion of their urine naturally, but still have more or less of a residuum which is beyond their control, they must be guided by their sensations. Care should be taken to encourage all natural efforts, so that the patient need not become absolutely dependent on the catheter. One man finds comfort from the use of the instrument once in twenty-four hours, whilst others resort to it oftener. So long as the instrument affords ease to the individual, I am not aware of any reasons for limiting its employment. I have known patients attribute attacks of orchitis to the frequent use of their instruments, but I am disposed to connect this with the manner of its employment rather than with anything else. A catheter with a cracked or ragged eye, by scratching the prostatic urethra, is often a cause of sympathetic orchitis.

TWENTY-FIRST LECTURE.

Complicated Forms of Prostatic Obstruction—Perinæal and Supra-Pubic Prostatotomy and Prostatectomy.

Proceeding with the subject of prostatic obstruction, we have now to discuss instances which hardly came within the scope of those referred to in the preceding lecture.

4. *Obstructing prostates in their most advanced forms, usually complicated with more or less inflammation of the bladder.* Fortunately, these instances are not very common, and the latter contingency need not necessarily arise even amongst those who are entirely dependent on the catheter, and have every prospect of being so for the remainder of their lives—a prospect which is often found to cover a considerable number of years. Much of this immunity from any further inconvenience, or deterioration of health in connection with the use of the catheter, is directly associated with the whole conduct of what is now known as catheter life. The initial steps of this process have been dealt with in the last lecture, and it is here to be understood that so long as a man can keep himself well and comfortable by the use of this instrument, he should submit to the inconvenience with contentment, and refrain from incurring risks which his condition does not warrant. Accidents, however, will occur in the course of the most careful catheterism either in the hands of the patient or his attendant, overgrowth may be unusual and excessive, spasm and irritability of the bladder unceasing, and bleeding frequent and profuse. These denote conditions of exceptional distress

and danger, which surgery must meet when all ordinary assistance has proved to be unavailing. It is to such experience as we have in connection with states of this kind that I shall now refer. It must be understood that difficulties of this character cannot be met by temporising measures, such as various forms of tapping the bladder or tying in a catheter, but that means likely to afford something approaching to permanent relief require to be entertained. These will be best noticed in the form of illustrative cases.

Puncture of the bladder from the perinæum through the enlarged prostate, with retention of a cannula. This process has been referred to as tunnelling the enlarged prostate, an instance of which I append.

Case.—N. D., aged 84, was admitted into the Liverpool Royal Infirmary on November 4th, 1881, with a large prostate and a distended bladder. My house-surgeon, Dr. Laimbeer, found him bleeding from attempted catheterism. Recognising the urgency of the case, and finding catheterism impracticable, he emptied the bladder with the aspirator above the pubes. I saw the patient a few hours afterwards, and found he had not passed urine since, and that no catheter could be introduced. His tongue was brown, and he was much exhausted. Later on, I again visited him, when the bladder had become distended. I then had him placed under ether, and succeeded in passing a gum-elastic prostatic catheter, but refrained from drawing off the urine, recognising that then either the catheter must be retained or re-introduced, neither of which proceedings I was disposed to adopt. This was a case where, in my judgment, it was wisest to establish a permanent drain, and to effect this in the manner on which I had determined required a tense, and not a flaccid, bladder. Retaining a catheter in the bladder of an old man, somewhat childish and disposed to remove any appliance if not closely watched, is not easy, and, if provided for, often ends fatally from cystitis, pyelitis, and exhaustion.

I had the patient placed in the lithotomy position. Taking a

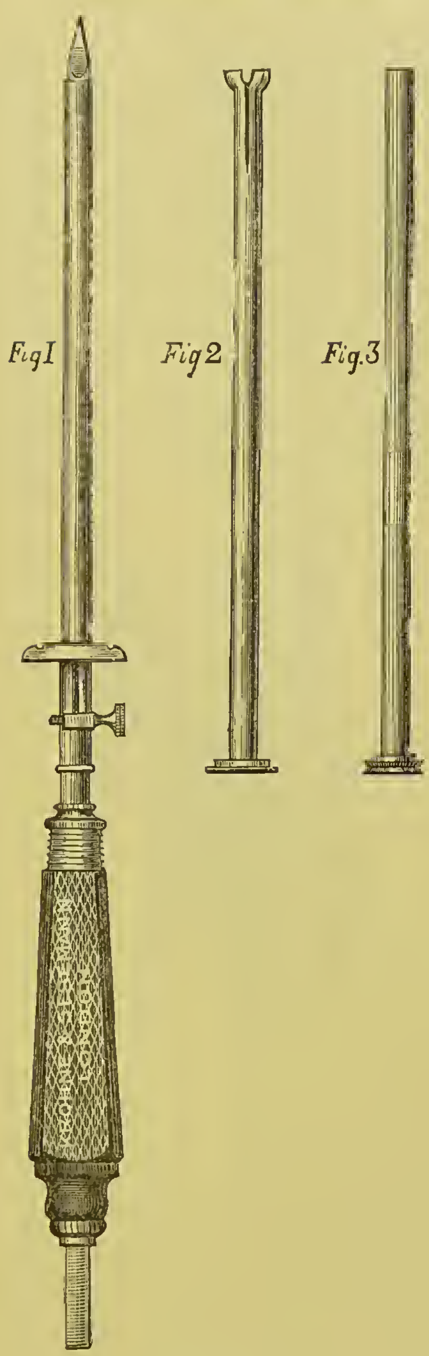

Fig. 60.

Fig. 1 represents the trocar with cannula complete. A piece of india-rubber tubing is to be attached below the collar of the cannula on withdrawal of the trocar, to convey the urine into a receptacle. Fig. 2, silver cannula, which is introduced in tube of Fig. 1 to form a probe end, and for retaining it. Fig. 3, a plain silver tube with which to clear tube (Fig. 2) in case of its becoming blocked up.

trocar which had been made for the purpose, with a silver cannula (Fig. 60), I introduced it in the median line of the perinæum, three-quarters of an inch in front of the anus, and pushed it steadily through the prostate into the bladder, at the same time retaining my left index finger in the rectum for a guide. On withdrawing the trocar, a large quantity of ammoniacal urine escaped. The cannula, being provided with a shield, was secured in its place by tapes, much in the same way as a tracheotomy-tube. A piece of india-rubber tubing was attached to the portion of cannula which projected beyond the shield, and conveyed the urine into a vessel placed at the side of the bed. Through this tubing urine continued to dribble. The patient was at once made comfortable, and in forty-eight hours was up, sitting in an easy-chair—an important matter with old persons. To permit of this, the rubber tubing was shortened during the daytime, the end of it being tucked through a light abdominal belt, where it was compressed by a small pair of bulldog forceps, which were removed when the patient desired to pass urine (Fig. 61). He is quite as well as most men are at eighty-four years of age. He gets up daily, takes his food, and sleeps comfortably, either on his back or his side, without any narcotic, and is quite free from any urinary inconvenience other

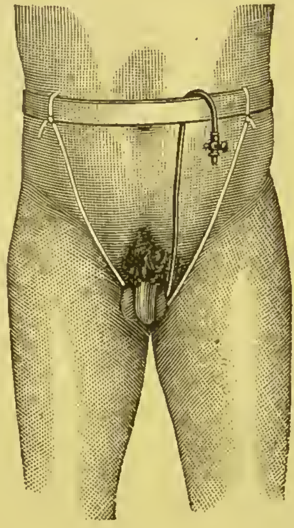

Fig. 61.

than wearing the tube. During the night his sleep is not broken by calls to micturate or pass catheters, as his urine runs off by the tubing as it is excreted; whilst in the daytime, when he is up and about, his act of micturition practically resolves itself into something equivalent to the turning of a tap. His urine, which had been fœtid and ammoniacal, is now nearly normal, the bladder being readily washed out by applying a syringe to the cannula twice a day. On two or three occasions the cannula has accidentally slipped out whilst the tapes were being changed, but has been readily replaced by the nurse. The somewhat enthusiastic manner in which the patient compares his present with his past condition cannot be allowed to pass entirely unnoticed.

For about six weeks after the bladder was tapped the patient passed urine entirely through the cannula. His health rapidly improved, and he was able to go about as if nothing ailed him. Then it was noticed that urine in gradually increasing quantities began to flow through the natural passage, so much so as to lead me to infer that, for some reason or other, the prostate was ceasing to obstruct micturition. On January 28th, 1882, I removed the cannula; the punctured wound healed in the course of a few days, and the bladder gradually recovered its natural function and power. The patient now retains his urine for two or three hours at a time, and at night he only requires to urinate twice or thrice. It may be said that the functional symptoms of enlarged prostate have disappeared.

The history of the patient pointed to the presence of the usual symptoms of enlarged prostate obstructing micturition, though we could not discover that complete retention had ever previously occurred. On the day of his admission it was ascertained by examination from the rectum, both by Dr. Laimbeer and myself, that the prostate was greatly enlarged. After the tube had been removed, we found evidence, from a similar examination, that the prostate had undergone a marked diminution in size; in fact, but little that was abnormal could then be detected. I saw this patient in 1884; he was in perfect health, and free from all urinary troubles. He died at the age of ninety, without any recurrence of his ailment, or the necessity for again using a catheter.

My object in planning the operation was to obtain what I may describe as a short low-level urethra, adapted to the altered relations of the bladder to the prostate when the latter becomes enlarged, for the purpose of securing complete drainage. Here, then, was a case where a surgical proceeding on the enlarged prostate not only immediately relieved urgent symptoms, but was followed by its rapid atrophy—a result which, so far as I know, had not been previously noted. Atrophy of the large prostate following incision I have occasionally observed in connection with the operation of lithotomy in elderly persons; it has, I believe, happened under similar circumstances to the normal structure. It is probable that the retention of a cannula in the prostate for a period of over two months may have induced changes in the part similar to those observed to follow the use of setons, where wasting of the adjacent tissues takes place. Mr. T. Pridgen Teale has made some pertinent observations on atrophy induced by cicatrix, and its surgical value.*

Commenting upon this case, the late Professor Gross remarks: "When the bladder is chronically inflamed, from enlargement of the prostate gland, tapping may be performed through this organ, as was recently suggested and successfully practised by Mr. Reginald Harrison. My conviction is that this operation is destined to come into general use in this class of cases, of such frequent occurrence in advanced life, and a source of so much suffering."†

Other radical measures for dealing with advanced forms of prostatic obstruction may thus be classified:—

(1) The division or ablation of the obstructing portion of

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* *British Medical Journal*, Dec. 11, 1869.

† *A System of Surgery*, sixth edition, 1882, vol. ii, p. 703.

the prostate by instruments passed along the entire urethra: this includes varieties of internal prostatotomy as practised by Mercier and Gouley, and the application, by Bottini's method, of the thermo-cautery.

(2) The division or partial extirpation of the prostate from an opening made into the membranous urethra from the perinæum, by means of which the finger can be brought into direct contact with the part, as in the methods advocated by Gouley, Annandale, Keyes, Watson, myself, and others.

(3) The opening of the bladder above the pubes to permit of an ocular inspection and removal of the part, as adopted by McGill, Belfield, Dittel, Robson, and others.

(4) A combination of the supra-pubic and perinæal methods, as illustrated by Schmidt and Belfield.

In addition to these methods there are others, such as the injection of iodine into the part (Herne) and electrolysis (Newman). I shall, however, limit my remarks almost entirely to those measures in the performance of which, or in observing their results, I have had some practical experience.

Of Bottini's method, in its present form, I cannot speak in terms of recommendation, as it wants a precision in its application which is difficult to obtain under conditions presented by many varieties in the form and extent of the enlargement. Dr. Hector Morotti, a former pupil of Bottini's, gives the following results: "Dr. Bottini has operated after this method in 57 cases, two of which ended fatally: these, however, were during the early days of the operation. In 32 cases a perfect cure had been obtained, in 11 there was improvement, and in only 12 was no benefit observed."* Of electricity in another form, as by Apostoli's method as applied to uterine fibroids, I have had so little experience that I wrote to Dr. Belfield, who I knew had been practising it. He replied: "I have not in a single instance been able to demonstrate a reduction in the size of the organ; while it is true that nearly all the patients have shown a marked amelioration of symptoms, yet I am not sure that this result should not be attributed to the mechanical influence of the electrode."

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* *Edinburgh Medical Journal*, March, 1891.

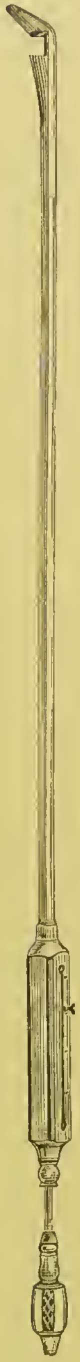
Fig. 62.

I have adopted, on several occasions, Mercier's method of dividing the prostatic bar by an internal urethrotomy, though no permanent good ever came of it, and this opinion is endorsed by Mr. Swinford Edwards.*

Fig. 62 represents an instrument given to me by Dr. Gouley, of New York, which can be used either for punching out a portion of the prostatic bar or for estimating its thickness. The latter object can, as a rule, be ascertained, when the patient is under an anæsthetic, by merely reversing the ordinary sound whilst the index finger of the opposite hand is placed in the rectum (Fig. 63). With the view of making a somewhat freer section of any obstruction that might be found presenting the form of a bar, I had a prostatome made by Messrs. Krohne and Sesemann, somewhat on the principle of Watson's well-known urethrotome for stricture, but this gave no better results. In addition to section thus performed I tried the effect of divulsing the divided tissue by means of a prostatic dilator, which was made for me by Messrs. Tiemann, of New York (Fig. 64). By means of a screw at the handle, any direct gradual pressure that may be required can be exercised on any part of the prostatic circumference, the instrument being enclosed in a soft rubber hood, which protects the part from damage. The benefit, however, was only temporary, as it was found impos-

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* *Lancet*, July 11, 1885.

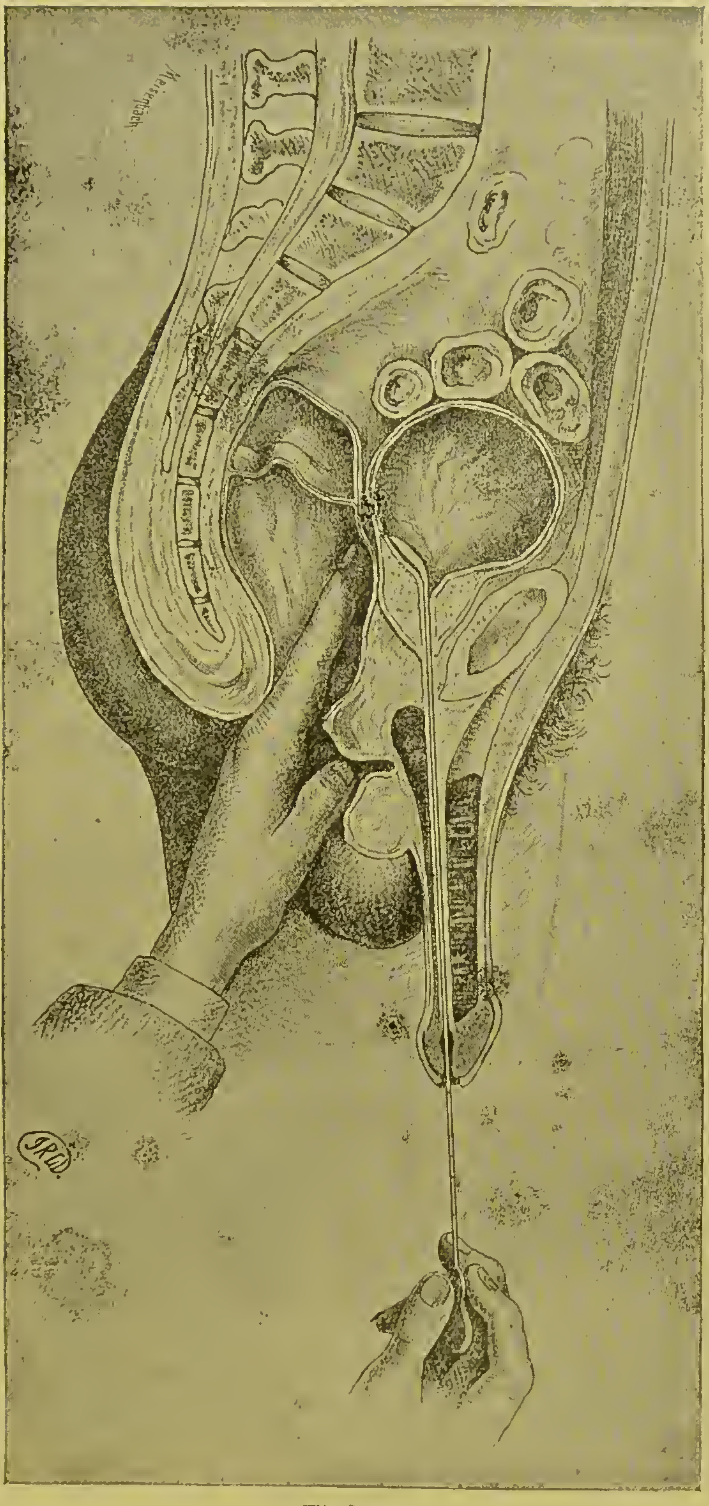

Fig. 163.

sible to deal with the obstruction at so great a distance from it. These and such-like methods of treating the obstructing prostate seem to have given place almost entirely to others which have arisen out of (1) digital exploration of the prostate and bladder from an opening made in the membranous urethra, and (2) supra-pubic cystotomy.

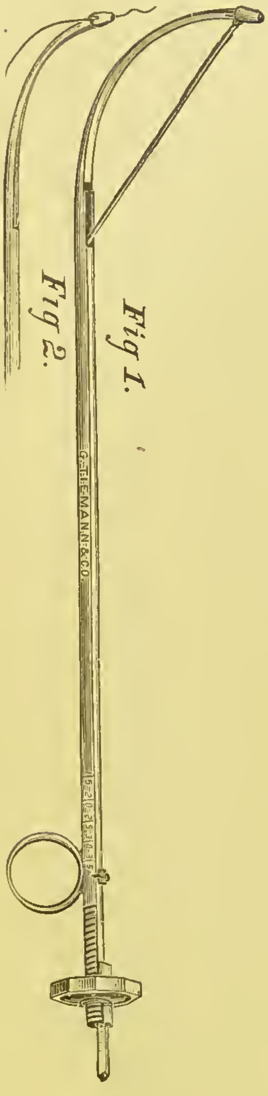

Fig. 64.

Perinæal Prostatotamy. This operation, as I described some years ago,* consists in opening the membranous urethra from the perinæum on a guide, and introducing the finger within the prostatic urethra. The obstructing portion is then divided in the median line, partly by incision with a probe-pointed knife, and partly by divulsion with the finger or large-sized bougie until the access to the bladder is felt to be free. In some instances I found it better to make the prostatic incision from within outwards, with a curved probe-pointed bistoury. Unless this is done the division may be incomplete. In performing this operation it is not desirable to make an opening larger than will admit the index finger from the perinæum into the bladder; such an opening is completely filled up by the drainage-tube, and consequently but little risk of hæmorrhage need be entertained. The drainage-tubes I am in the habit of employing after section of the prostate has been effected are gum-elastic, as described in the Eighth Lecture. Where the bladder is much pouched a double tube may be used, as shown in the sketch (Fig. 65).

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* *Trans. International Medical Congress*, 1884.

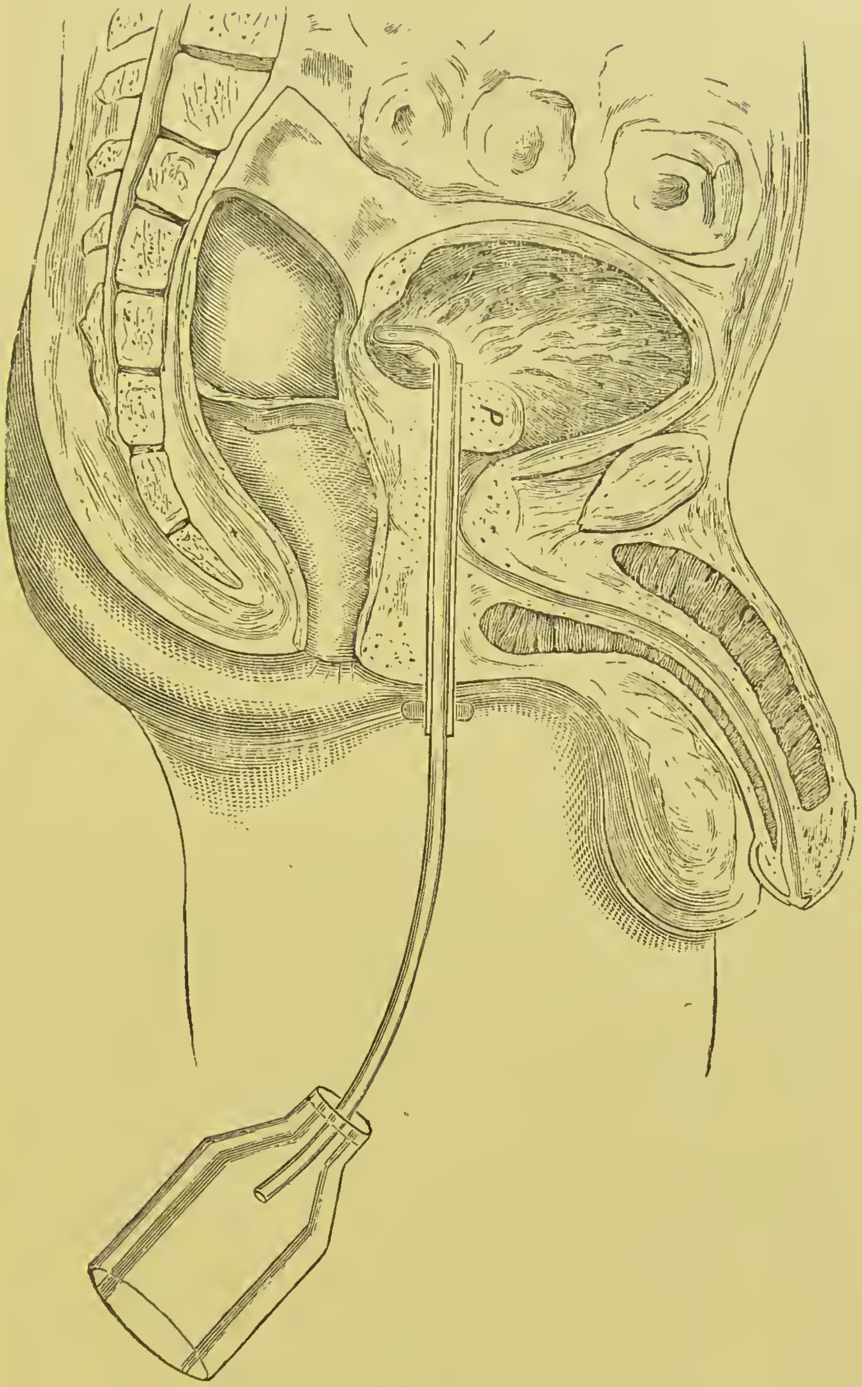

Fig. 65.

When the patient gets up, as he usually does in about three weeks after the operation, the bladder drainage-tube is connected with a piece of rubber tubing about two feet long, terminating in a small stop-cock, and retained in its place by a T bandage, as shown in Fig. 61. When he requires to pass urine all he has to do is to let down the end of the tubing from his belt and turn the stop-cock. I generally use Professor Annandale's tube, as supplied by Messrs. Gardner, of Edinburgh. I have had patients up and about with this arrangement for passing water within ten days from the operation. I do not find that the urine leaks through the wound by the side of the tube if it is properly made and the apparatus correctly adjusted. Where the perinæal incision has been made rather larger than the drainage-tube, I partially close it with sutures, so as to make the fit more accurate.

I attach much importance to the prolonged use of the drainage apparatus, the object being to render the section of the prostate not a temporary one, as after a lithotomy where no such provision is made, but permanent. Hence I am in the habit of retaining these tubes for six, eight, ten, or twelve weeks. If after such periods, on removing the tube, I find that a catheter can be made to enter the bladder easily along the natural route, or if, as sometimes happens, urine forces its way in spite of the perinæal tube along the natural passage, I regard these as indications that the object in view in the retention of the drainage-tube has been obtained. The regular use of the bougie is continued until the perinæal wound has soundly healed, a process which usually takes place rapidly, and leaves no trace behind it. As a precautionary measure, patients are enjoined to continue to use the bougie occasionally. I have had a special bougie made with a rounded projection on the curve, which some patients have used most beneficially (Fig. 66). I will briefly narrate the particulars of two cases illustrating the symptoms to which the operation is applicable.

Case I.—D. E., aged 68, a waiter, came under my care at the Liverpool Royal Infirmary, during 1883, with an atonied bladder and retention of urine from a large prostate. There had been great difficulty in passing the catheter, and much blood had been lost. The patient was very childish in his habits, and it was found impossible to make him retain a catheter. After three weeks' trial of various plans of treatment without avail, I performed the operation described, and divided a prostatic bar of considerable thickness. No further hæmorrhage followed the operation, cystitis disappeared, and the urine became normal. The patient was able to get up and go about in ten days, discharging his urine at will by turning the tap connected with the drainage apparatus, which was used for eight weeks, when it was noticed that, in spite of the tube, a certain quantity of urine made its way along the urethra. The tube was then withdrawn, and the perinæal wound rapidly closed. He has been examined before the clinical class at the Royal Infirmary, and though the prostate remained large, there was no difficulty in micturating, or in passing the largest-sized catheter into the bladder. He could retain urine for four hours, the bladder had acquired its natural power of expulsion, and there was no residual urine. Six months after the patient left the Infirmary he had a paralytic seizure, from which he did not recover, but it was not necessary to resort to catheterism.

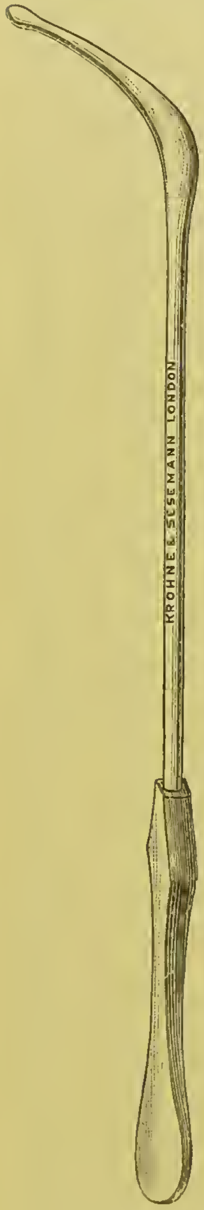

Fig. 66.

Case II.—In August, 1885, I met a man (J. B., aged 73) in the street, carrying a heavy load on his back, whom I recognised as an old patient upon whom I had performed perinæal prostatotomy. I found that he was quite well, and had never used the catheter since he left my care. The circumstances of this case are briefly these. He was sent to me by Dr. A. Barron. He had a large prostate, and required constant catheterism for retention; the instrument was difficult to introduce, and serious hæmorrhage frequently took place. For three weeks he was treated by me in the Royal Infirmary in various ways, but with no benefit. His desire to urinate and his strainings were incessant, and all measures to give relief were ineffectual. In February, 1884, I performed perinæal prostatotomy, and he wore one of my tubes continuously for seven weeks; the perinæal wound closed, and he shortly afterwards left the Infirmary with the result I have already mentioned. I have more recently had an opportunity of passing a full-sized bougie for him, and could detect no obstruction.

In June, 1883, I reported* one of my earliest cases where I had thus operated. The patient remained under observation for some time afterwards, that is to say, for a year after he had discarded his catheter. In the next instance complete restoration of the function of micturition followed the operation. I referred to it, amongst others, in a paper on this subject.†

Case.—A patient, aged 56, saw me early in 1891. He was suffering from enlargement of the prostate, which could be felt from the rectum, and inability to empty his bladder. He was entirely dependent on the use of the catheter. The enlargement occurred at an earlier age than usual, but the facts were as stated. Though he then complained greatly of the pain that the retention caused, I strongly advised him to remain content with the use of the instrument, and prescribed him some ergot. Four months afterwards I again saw him; the physical conditions were unaltered, but the pain was increased, and the catheterism intolerable. He asked me to undertake any operation which might offer relief. Otherwise his health was excellent. I performed perinæal prostatotomy over twelve months ago, and he has never had occasion to use a catheter since. I passed a catheter for him a short time ago, and found that he completely emptied his bladder. He was in good general health.

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* *British Medical Journal*, June 9, 1883.

† "The Restoration of the Function of Micturition," *ibid.*, March 11, 1893.

The forcible use of a metallic instrument or catheter for the purpose of overcoming the obstruction caused by a hard fibrous prostate is so likely to be attended with disastrous consequences as to render such a course inadmissible save under very exceptional circumstances. I have met with two instances (given below) where, though considerable damage must have been done in this way, the individuals seemed to have profited by what happened, as by this rude process, I believe, the obstruction was removed. I wish I could say the same for other cases of forced catheterism which have incidentally come under my notice.

Case I.—An elderly gentleman had long suffered from a large prostate with residual urine. There was some difficulty in getting the catheter into the bladder through the prostatic urethra. As other symptoms of vesical irritation showed themselves, he was on my advice sounded for stone. This was described to me as painful, and followed by hæmorrhage and cystitis. Three months afterwards he came to thank me for the operation I had advised, for though no stone was discovered, he had since passed water easily, and had not required to use a catheter. A suspicion occurred to me as to what had been done by a sounding which was followed by such serious symptoms. I passed a catheter without either difficulty or pain, but, what was still more significant, without finding any residual urine. How was this change to be accounted for? The conclusion I came to was that not only had the obstructing prostate been penetrated, but the bridge of tissue above the false passage had either been torn across or had subsequently sloughed. How this could have happened is shown by a reference to Figs. 67, 68, representing two specimens sent me for examination, which are now in the Liverpool University College Museum. The practitioner who attended this patient at all events got the credit, and deservedly so, of having cured his patient, though, as the latter remarked, "the operation was pretty severe." Had an anæsthetic been used, it is probable the patient would never have been fully conscious of the process by which, somewhat haphazardly, he had reaped so much permanent good.

Case II.—Some years ago, I was asked by the late Mr. James Long to see with him an elderly gentleman who was blanched from profuse hæmaturia. Six days previously, a large metallic prostatic catheter had been passed for him with difficulty, pain, and hæmorrhage. In consequence, more especially of the profuse and continued bleeding, Mr. Long had been called in. Every means was adopted to arrest the bleeding, but failing these I was asked to perform an exploratory operation, with the view of getting at the bleeding spot, which was deemed to be within the prostatic urethra. I performed median perinæal urethrotomy, and my finger, on entering the prostatic urethra, passed on into the bladder through a hole at the base of the projecting portion of the part, which we concluded had been made by the prostatic

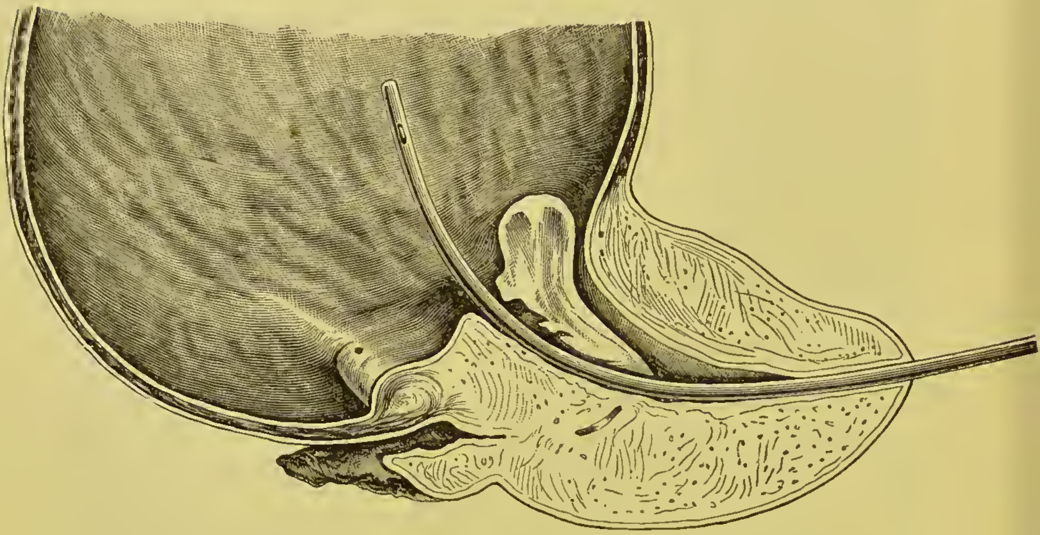

Fig. 67.

catheter. As my finger was pushed in, a bridge composed of sloughy prostatic tissue broke down, thus rendering the opening into the bladder completely free. There was considerable oozing of blood from the broken-down prostate. The bladder was washed out and freed from clots, and an old-fashioned umbrella-tampon introduced, by means of which the wound was carefully plugged. No further hæmorrhage occurred, urine escaped through the tube, and the latter was not removed for a week, when a fresh one was substituted. Though the patient

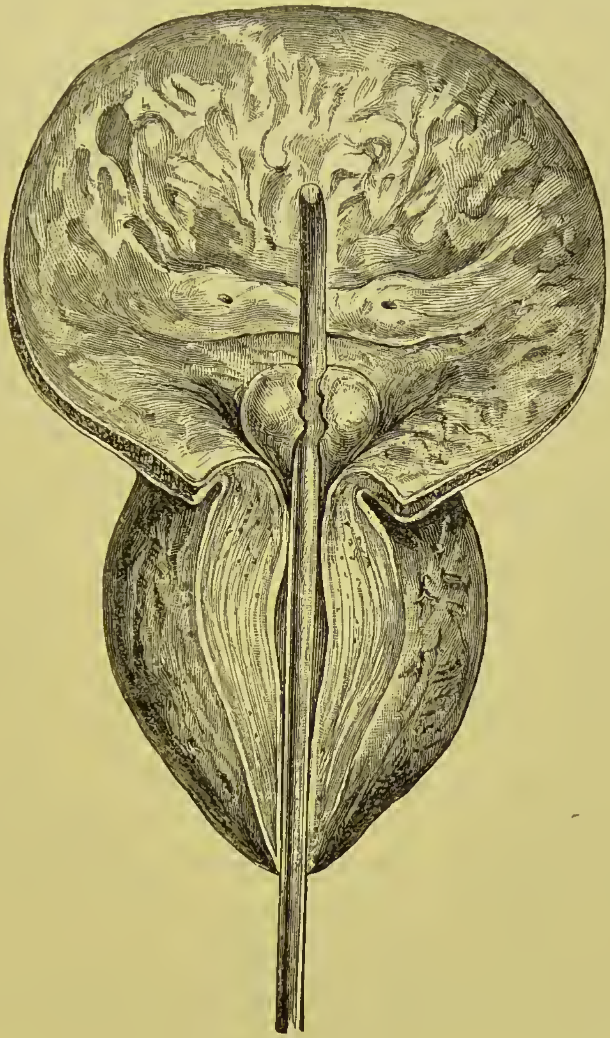

Fig. 68.

remained in a critical condition for some weeks, he ultimately made a good recovery. For two years I frequently met him, and ascertained that he remained well. Partly by the catheter, and partly by subsequent sloughing, the obstructing prostate was so completely removed that I was not surprised at the result. Some time ago I heard of his death from old age, without any return of his urinary troubles.

It sometimes happens that more or less of the mass constituting a hypertrophied prostate undergoes inflammation and suppuration of an acute kind. A patient who has been in the habit of using his catheter daily takes a chill, his bladder becomes unusually irritable, there is much bearing-down pain, and the use of the instrument is intolerable. If an examination is made by the rectum the part is swollen, hot, and exquisitely sensitive. After a few days' suffering of this kind, relieved to some extent by warmth and anodynes, the patient has a chill or rigor, followed by the sudden discharge of stinking urine, containing a considerable element of pus; then relief comes, and convalescence takes place. I have seen several instances more or less corresponding with this description. In some permanent benefit has followed, no doubt owing to the destruction of a certain amount of hypertrophied prostatic tissue, and the subsequent obliteration and contraction of the abscess cavity. When there is reason to believe that pus has in this way been discharged, the bladder should be carefully washed out twice a day with some bland antiseptic fluid until the urine becomes normal. In this way good has come out of evil.

There is a modification of the perinæal proceeding advocated by Mr. Walter Whitehead,* which, in feeble subjects who are the victims of advanced forms of prostatic obstruction, entails small risk with the prospect of obtaining much comfort and health. It consists in puncturing the membranous urethra, introducing a drainage-tube, and providing a permanent vent for the urine in this position. I will briefly illustrate this practice from a case of my own :—

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* *Transactions of the Medical Society of London*, vol. xii.

Case.—G., aged 67, seen in August, 1889, with Drs. Floyd and Pinkerton. He was suffering from a very large fibrous prostate, where catheterism had become increasingly difficult and painful. Then hæmorrhage occurred, and after a month's trial with catheterism and other measures the powers of the patient began to fail from constant pain and loss of sleep. Ether having been administered, I punctured the membranous urethra on a grooved staff and put in a drainage-tube. The latter was arranged as shown in Fig. 61. The patient was immediately relieved, and soon regained his health in spite of the feebleness his prolonged illness had caused. I wrote to him in December, 1892, and received the following reply : "The tube used is the same as first obtained from Gardner, of Edinburgh. I wear it always, and have no trouble with escape of urine,—some passes now and then by the natural passage, but very seldom. Ordinarily, I am scarcely aware of the tube being present, and am not tempted to try to dispense with it. As to my general health, you may judge from the fact that I have to-day been to the Autumn Exhibition for the eighth time this year."

This is a fair sample of other cases which have received relief in this way.

The establishment of a supra-pubic fistula for permanent urination in cases of great difficulty and distress from enlarged prostate has, in these exceptional cases, been practised by Sir Henry Thompson. From the few cases I have seen, I prefer the perinæal method ; the latter operation, if correctly performed, is easy and free from risk. For use, where a supra-pubic method is preferred, Mr. Buckston Browne* has devised an apparatus consisting of a tube and silver shield. By means of this the urine is conducted into a receptacle which is strapped to the patient's leg. Dr. Gerris[*] has also described something of the same kind.

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* *British Medical Journal*, August 4, 1888.

My attention was first directed to removing portions of the prostate through an incision made from the perinæum by the following case, which formed the basis of a short paper[†] upon the subject:—

CASE.—W. B. H., a Custom-house officer, aged 67, was admitted into the Liverpool Royal Infirmary under my care on September 2nd, 1881, having been referred to me by Dr. Samuels. He had been suffering from symptoms of stone for seven years. I sounded him and made out that his bladder contained a large oxalate of lime calculus; further, that his prostate was enlarged. On September 5th I performed lateral lithotomy; on seizing the stone I found it was so large that I made a bilateral section of the prostate, a course I was prepared for, and one which I had successfully adopted on two previous occasions where I had to remove hard stones, weighing over two ounces. Though this extension of my deep incision gave me additional room for extraction, I recognised that the enlarged prostate still remained an obstacle. As a portion of the prostate seemed loose and disposed to come away, I enucleated it with my forefinger, and slipped it out, when I was able to remove the stone from the bladder without force. There was no bleeding worth mentioning either at the time of or after the operation. The patient made a good recovery, and left the Infirmary on November 5th. There was nothing to remark about the temperature during the whole of the treatment. The growth removed was about the size of a walnut, and it was almost divided into two portions by the incision into the prostate. In structure it resembled an adenoma. The stone was an unusually large specimen of oxalate of lime, covered with small spines, some of which were broken off by the forceps during extraction. It weighs two ounces and five drachms.

[*] "An Appliance for Permanent Use after Supra-pubic Cystotomy," *Transactions of the American Surgical Association*, vol. x.

[†] *Royal Med.-Chir. Trans.*, vol. lxv.

By the kindness of my former colleague, Mr. Bickersteth, I am enabled to give the particulars of a case similar in many respects to the last. Both specimens are in the Museum of the Liverpool University College.

Case.—A gentleman, aged 63, had suffered from symptoms of stone for fifteen years. Mr. Bickersteth, considering that it was a case for lithotomy, performed the lateral operation. Finding, as he had anticipated, that the stone was large, he extended the deep incision and made a bilateral section of the prostate; this enabled him to make out that in addition to the calculus he had a large growth connected with the prostate to deal with. After extracting the stone with the forceps, he shelled out with his index finger a mass about the size of a hen's egg, which proved on examination to be an adenoma of the prostate, not a true hypertrophic growth; the stone weighed nearly two ounces and a half. The patient made a good recovery, and to the present date remains perfectly well. The operation was performed on October 21st, 1878.

The late Sir William Fergusson drew attention to this subject,* and narrated a case where, in a patient eighty years of age, after removing the stone by lithotomy, he extracted the lower part of the prostate with the finger as readily as if it had been a stone. The patient not only recovered from the operation, but never showed any further signs of prostatic irritation. In his paper, Sir William Fergusson concludes with the remark: "I have thus ventured to put on record what some of my professional brethren may have hesitated to do from a fear that they may have been guilty in their operations of perpetrating some rough mechanism not in accordance with that nicety of manipulation which is thought so essential in the performance of the master-handiwork in surgery—lithotomy."

Mr. Cadge † has reported a case where he removed during a lithotomy, in the forceps between the joint of the blades, three masses which were found to be fibrous outgrowths of the prostate. In commenting upon this case, Mr. Cadge says: "In about two months the wound was perfectly healed; there is incontinence, which may be in a great part due to the removal of the prostatic tumour, but it must be remembered that it also existed before the operation. It has happened to me twice before to remove small fibrous tumours of the prostate gland during the operation of lithotomy, and apparently without harm to the patient." Dr. C. Williams, of Norwich,* narrates a case where he removed, accidentally, between the forceps, an enlarged middle lobe of the prostate. In three weeks the patient was reported as recovered, having seldom to micturate more than once in the night.

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* "Observations on Lithotomy and on certain Cases of Enlarged Prostate," *Lancet*, Jan. 1, 1870.

† *Trans. Path. Soc.*, vol. xiii.

From the illustrations I have submitted we might draw three conclusions: 1, that cystotomy may be practised in certain cases of enlarged prostate which are attended with symptoms producing great distress, with the view of exploring and, if possible, of removing the outgrowth; 2, that in all cases of cystotomy for calculus, where the prostate is found to be enlarged, a careful search should be made with the finger, with the object of effecting the removal of the growth should such be found practicable; and 3, that in determining the selection of lithotomy or lithotrity in a case where stone in the bladder is complicated with enlargement of the prostate, regard should be had to the possibility of removing both of these causes of distress by the one operation, namely, by lithotomy.

As to the precise method of removing a prostatic outgrowth that might be discovered either in the course of a lithotomy or in an exploratory operation specially undertaken for this purpose, Dr. Gouley remarks, after describing a median perinæal section for the ablation of median prostatic outgrowths:* "The surgeon should then endeavour to give permanent relief by a procedure which will probably not add greatly to the dangers of the preceding steps. He should first explore the prostate through the artificial opening, and if he discover a median outgrowth, or isolated tumours, he should dilate the prostatic sinus, or incise the prostate laterally, and enucleate the tumours, or, if there be a median outgrowth, excise it; but the better plan is to remove it by means of a small wire écraseur, and then to introduce a large-sized soft vulcanised india-rubber catheter, and retain it in position for two or three days." Writing to me in 1883, Dr. John Ashhurst, of Philadelphia, says: "I have lately had occasion to remove an enlarged 'third lobe' after median lithotomy for a broken catheter in the bladder, with the effect of giving the patient entire relief."

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* *British Medical Journal*, June 15, 1878, and Nov. 14, 1885.

And what may be done in the course of either a lateral or median lithotomy may be effected by the median incision I have advocated for the purpose of dividing the prostatic bar, as on several occasions I have thus removed portions of obstructing tissue which came in my way. In summarising my operations of the prostate by the perinæal route, I find that I have now operated in over thirty-five cases in males, about or over sixty years of age, excluding malignant growths and cases where lithotomy has been performed. In eighteen of these instances either the floor of the prostate was divided or a portion of it removed before the drainage-tube was inserted, whilst in the remainder the perinæum was merely opened for the introduction of the tube and its retention in this position. Of the deaths shortly following these perinæal operations I only know of three—one a week, another four weeks, and the third two months afterwards. One man, aged 68, died six months subsequently (p. 287) from a paralytic seizure, and during his last illness was saved from the necessity for catheterism. Two persons died over twelve months after the operation, but as in this interval they had been active and well, and had no return of prostatic obstruction, they cannot be included in the mortality list so far as this proceeding is concerned. Of the remaining twenty-nine persons, something was known of nineteen of them at or about twelve months after the operation. Three of these were purposely provided with a perinæal opening, which they utilised in the manner referred to in a previous case (p. 293). The third had, in addition, a tight urethral stricture, and, like the case detailed on page 160, preferred retaining the short route, which remained perfectly under his control. Of the sixteen whose artificial openings have soundly closed, ten are independent of the catheter. Of the other six, four have to use the instrument as before the operation, but do so without difficulty, pain, or bleeding. The remaining two have had further trouble in urinating; in one the obstacle being due to the impaction of a calculus from which the patient had previously suffered. The obstruction from this cause was, however, only of a temporary nature. About ten, nothing can be ascertained, though four are believed to have left England altogether. In considering an analysis of this nature, it must be remembered that these cases have ranged over a period of eight years, and the operation was in all instances only undertaken by reason of the catheter ceasing to give relief, and with the prospect before the patient of a speedy dissolution with symptoms of a painful nature.

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* *Diseases of the Urinary Organs*, by Dr. J. W. S. Gouley, New York, 1873.

A question that naturally arises in connection with these cases is, Have any effects on the enlarged prostate been observed? I have already stated that shrinking of this part has followed in instances where the bladder has been tapped through it, and the cannula retained, as in the case recorded on page 276. I am tolerably sure that I have seen somewhat similar effects happen when drainage alone is employed, and

I make this statement on the ground that, where the urine has thus been allowed to escape from the bladder without effort, it will often, after a time, force its way, in spite of the tube, along the urethra. I have noticed this on so many occasions that, when it occurs constantly, it is taken as a sign that the drainage-tube may usually be removed. Further than this, evidence of the reduction in size has been afforded by examination from the rectum. If, as I have ventured to suggest, hypertrophy of the prostate is associated with the large amount of muscle entering into its composition, it is not surprising that the induction of a state of complete physiological rest should be followed by the result I have noted.

Supra-pubic Prostatectomy. It will be gathered from my previous remarks that, though the perinæal operation is best adapted to the collar or bar-like forms of prostatic enlargement which obstruct micturition as the fibrous degeneration of the part mentioned by Mr. Griffith* proceeds, there are other varieties to which the supra-pubic operation seems applicable. The former kind is approximately illustrated by Fig. 49, whilst the latter, where a more or less pendulous mass of prostatic tissue encroaches on the interior of the bladder, is well shown in Fig. 52. In these outgrowths, as with tumours of the interior of the bladder, we have a serious source, not only of obstruction to the escape of urine, but of irritation and inflammation. It is under such circumstances, where judicious catheterism and other means of this kind have failed, that the patient seeks further relief at our hands. By their symptoms, combined with a physical examination of the parts as illustrated, the two varieties can generally be sufficiently distinguished for diagnostic purposes. Though Dr. Belfield, of Chicago, appears to have been the first to practice supra-pubic prostatectomy, there can be no doubt that we are very largely indebted to the late

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* *Journal of Anatomy and Physiology*, vol. xxiv.

Mr. McGill, of Leeds, as well as to his colleagues, for the work which has been independently done in connection with this operation, and which has undoubtedly secured for it a place in the surgery of the urinary organs. In addition, many admirable records will be found from other surgeons illustrating the complete success this operation has obtained not only in relieving symptoms which otherwise would have culminated in speedy death, but of completely restoring the function of micturition. Mr. Buckston Browne has recorded a good example.* Mr. T. P. Teale writes me, as these pages are going through the press: "I have just seen a patient from whom I removed, three months ago, an enlarged third lobe of the prostate by supra-pubic operation. For some time he could not empty the bladder without the catheter, and he was troubled six or eight times in the night to micturate. He has now perfect command over his bladder."

The operation is performed by opening the bladder above the pubes, as will be described in a future lecture. In this way the outgrowth is not only felt, but can be seen by a speculum introduced through the wound, as demonstrated by my colleague, Mr. Hurry Fenwick.† Various ways are adopted for removing what is necessary. In some instances, curved scissors will be most convenient; in others, the grape-like masses may be twisted off with a pair of forceps. Mr. R. F. Tobin,‡ in detailing a case of this kind, observes: "The instrument used to shave off this protuberance was an écraseur, extemporised in this way: A wire, doubled and bent to a suitable curve, was passed through the urethra into the bladder; a silver catheter was then slipped up along it, but its point, instead of being passed into the bladder, was made to impinge against the urethral obstruction." Dr. Keyes,§ in mentioning that he uses the

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* *British Medical Journal*, March 11, 1893.

† *Cardinal Symptoms of Urinary Disease*, 1893.

‡ *British Medical Journal*, March 14, 1891.

§ *New York Medical Record*, Oct. 31, 1891.

rongeur, observes, "The instrument next in value is the curved scissors, but the skilled finger is most important of all." It is well to have a variety of instruments, of the kind I have referred to, at hand, for, like teeth, these growths assume so many forms that one kind of extracting forceps is not likely to be found of universal application. On referring to Fig. 49, it will be seen how difficult such an operation is likely to be if applied for the removal of a bar or collar of prostatic tissue. It is when used under such circumstances that the operation really becomes a dangerous and a bleeding one, and thus, I believe, is explained the much larger mortality as compared with perinæal prostatotomy, where a division of the bar, after the manner I have already described, usually suffices. This point has been very clearly shown by Dr. Belfield * from his analysis of 133 operations on the prostate.

The after-treatment of these cases is much the same as that which will be noted in connection with supra-pubic cystotomy. Where the hæmorrhage is free, which is rare when the pedunculated masses can be twisted off, and resists ordinary measures, such as torsion, washing the bladder out with hot hazeline and water, or the use of some styptic such as the perchloride of iron, Dr. Keyes † recommends a graduated compress made of bichloride-gauze, secured in position by a stout silk ligature passed down the urethra. Dr. Cabot also refers to this appliance as answering admirably in a case where he removed a tumour as large as a small orange from the left lobe of the prostate. The bleeding was profuse, and was not stopped by hot water.

It must, however, not be forgotten that the greatly thickened and contracted bladder occasionally met with in association with prostatic obstruction would negative the selection of supra-pubic prostatectomy. Dr. F. S. Watson ‡ observes that in some instances he found "the bladder was so small and incapable of distension, owing to thickening and rigidity of its walls, as to render the supra-pubic operation impossible with its modern technique." As structural differences, though of another kind, apply in other instances with equal force to the perinæal route, it seems clear that no one method is of universal application, and that, subject to such general considerations as I have laid stress upon, each case should be judged upon its own merits. I have met with one instance of thickened and contracted bladder where by a supra-pubic opening nothing more than drainage could be effected.

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* *American Journal of the Medical Sciences*, November, 1890.

† *New York Medical Record*, Sept. 17, 1892.

‡ *The Operative Treatment of the Hypertrophied Prostate*, Boston, U.S.A., 1888.

In selecting or declining any of the procedures to which I have referred in this lecture, under pressure arising from the desire to give further help where it is clearly demanded, we must not forget entirely the class of persons with whom we have to deal. They are usually the old, feeble, and broken down, with little or no powers of resistance against either disease or trivial injury, and with greatly diminished, if any, sources of repair. If under these circumstances we can see our way towards supplying the relief, not to say anything of the prospect of recovery, on the lines that surgery is now cautiously moving in, as I have here endeavoured to indicate and illustrate, then I think such steps may be legitimately undertaken.

5. *Obstructing Prostates complicated with Stone or Tumour.* These will be considered in connection with the latter disorders.

TWENTY-SECOND LECTURE.

Acute and Chronic Inflammation of the Bladder—Atony—Cystitis in Women.

Cystitis, or inflammation of the bladder, is an affection of frequent occurrence. It is a disorder which often requires some mechanical management, such as the use of the catheter or washing out the bladder; and therefore, for its successful treatment, much depends not only upon the manual skill of the practitioner, but also upon his judgment in the selection of the necessary applications. Cystitis rarely occurs as an idiopathic disorder, but commonly in association with some other derangement of the urinary system. Formerly it was seen as a consequence of the old operation of lithotrity, where, after each crushing, rough fragments of stone were left in the bladder and excited inflammation. This complication often proved so rapidly fatal as to seriously compromise this proceeding. The important improvement introduced by Bigelow, of crushing and removing the fragments of stone by suction at the same time, disposed of the most frequent cause of acute cystitis we then had to deal with. This will be again referred to when I come to speak of the treatment of stone.

Acute cystitis is generally traceable to injuries involving the pelvis and bladder, to the introduction of foreign bodies or septic germs of an irritating nature into the bladder, and to the decomposition of urine. When the bladder is acutely inflamed we have all the local and general symptoms more or less prominent of an active inflammation of a vital organ. There is supra-pubic pain and tenderness, sometimes running into general peritonitis with vesical and rectal tenesmus, and the process of expelling the scanty high-coloured urine is extremely distressing. Sometimes there is retention, but not always. The urine is often remarkable in appearance, resembling thin prune juice, and containing blood and mucus intimately mixed with it. Under the acute cystitis of prolonged retention with decomposing urine, I have seen as a result, both in men and women, the whole mucous coat come away in detachments as a sloughy mass.

A rapid disorganisation of the bladder is sometimes observed in association with disease of the spinal cord, and is probably dependent, as Charcot * suggests, upon irritation of certain parts of the latter, and more particularly the grey matter. I am indebted to Dr. Glynn for the particulars of the following case, which I had an opportunity of seeing with him :—

Case.—T. R., aged 21, a porter, had previous to his present illness enjoyed good health. There was no history of syphilis. Two days before his admission to the Liverpool Infirmary, when at work, he was seized with pain in the bowels. He walked home, took a dose of castor-oil, and applied a mustard poultice to the abdomen. In the night he tried to get up, and found that one leg was useless and numb. In the morning both legs were numb and absolutely powerless, and he was unable to pass his water. When brought to the hospital it was found that there was complete loss of power and sensation in the lower extremities. The urine had to be drawn off, and was found to contain pus and mucus. It was alkaline, and in the course of two or three days large quantities of blood were found mixed with it. Extensive sloughing of the bladder followed, and for some time before death all the urine was passed by the rectum.

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* "Diseases of the Nervous System," by Dr. J. M. Charcot. *New Sydenham Society*, 1877.

On *post-mortem* examination the spinal cord in the lower dorsal region was found softened. On section the distinction between grey and white matter was ill defined. Under the microscope the large cells in the grey matter were much altered in shape, and dilated vessels and leucocytes were observed in large numbers. The coats of the bladder had sloughed, and abscesses had formed around it, through one of which a communication was established with the rectum.

It seems hardly possible, as Charcot urges, that such acute changes as these could be induced by the mere contact of urine, however decomposed, or by the introduction from without of any septic material by catheters. The rapidity of the symptoms, in the few instances of this condition I have seen, rendered all local treatment beyond the use of the catheter practically useless.

In the treatment of acute cystitis we shall do well, in the absence of obvious causes of inflammation, as injuries and such-like, to have regard to the possibility of a foreign body having been introduced into the bladder. In a most acute case of this kind it turned out that the patient had passed a grass head into the bladder, the stalk of which had penetrated the fundus of the viscus, and made its way, together with the urine, into the abdomen (Fig. 37). If there is a cause for the cystitis that can be removed, this will be the first indication to fulfil. For relief reliance will chiefly be placed in warm soothing applications about the part, with anodynes, either local or general. A few leeches applied to the perinæum generally remove the feeling of tension about the neck of the bladder which is often complained of. Demulcent drinks and febrifuges are also useful. I do not know anything which oftener gives relief than introducing a soft rubber catheter, and running into the bladder just as much warm water as can be tolerated with comfort. This may be done frequently, and is always grateful to the patient.

I will now notice those forms of cystitis of commoner occurrence which we meet with as complications of other urinary disorders. We shall recognise the following circumstances under which they happen: 1. As produced by the extension of inflammation from some other part, as in gonorrhœa; this may be called metastatic cystitis; 2. As a consequence of obstructed micturition, as in stricture, or hypertrophy of the prostate—the cystitis of obstruction; 3. As caused by an irritant in the bladder, such as a calculus or a growth—the cystitis of direct irritation.

It is not uncommon to find cystitis, in various degrees, occurring as a consequence of gonorrhœal urethritis, and, like other metastatic inflammations, the primary disorder often abates as the change in locality takes place. In the slighter forms of cystitis resulting from gonorrhœa, or when provoked by such causes as exposure to cold, we have this condition indicated by frequent micturition, and urine more or less loaded with mucus. In the severer forms, in addition to constitutional fever, the bladder is intolerant of the presence of urine within it, as indicated by frequency of micturition, and tenesmus produced by the contractile power necessary to expel. The urine becomes purulent, and a discharge of blood not infrequently terminates the act of its expulsion. I have observed the greater liability to cystitis and bladder irritation, as a complication of gonorrhœa, at seasons of the year when sudden changes in temperature are apt to occur. Hence the importance of providing against this by suitable clothing and by avoiding exposure to keen winds.

The treatment of this kind of cystitis must be in correspondence with the degree of inflammatory action that is taking place. In the milder forms, where irritation best describes the extent to which the bladder is implicated, the suspension of any kind of abortive local treatment, so far as the gonorrhœal discharge is concerned, is necessary. Rest, in the recumbent position, and soothing applications, in the form of hot opiate fomentations and sedative suppositories, must be substituted. Of the demulcents I have been in the habit of prescribing, I find the decoction of the ulmus fulva or slippery elm, in combination with the succus hyoscyami, affords the speediest relief. In cases of gonorrhœal cystitis, where the disorder has a tendency to become chronic, frequency in micturition and purulent urine remaining after the more acute symptoms have subsided, benefit will be found from the use of copaiba, or the oil of yellow sandal-wood; these remedies are, however, not well borne where there is general febrile disturbance.

Passing to the cystitis of obstruction, we shall find that this presents itself to our notice as chronic and sub-acute. The chronic form is usually seen in cases of enlarged prostate and in some of the commoner varieties of organic urethral stricture. The cystitis of the enlarged prostate is due, not alone to some urine remaining in the bladder, but also to the direct irritation produced by protruding masses of the hypertrophying part. This irritation leads to an excess of mucus being thrown out, and its accumulation with a residuum of urine in the most dependent portion of the viscus. The result of this is decomposition of the urine and the evolution of ammonia. By the constant presence of such compounds the bladder becomes inflamed, intolerant of its contents, liable to slight hæmorrhages, and incapable of performing its natural function with any comfort to the patient. Going a stage further on, the dilated ureters, and perhaps the pelvis of the kidneys, share in these changes, and thus serious complications are almost imperceptibly added. In certain cases of stricture much the same sort of thing occurs, though for obvious reasons the amount of the vesical mucus is not so great as in the former illustration; still it is sufficient to produce similar changes in the urine. This excretion is rendered alkaline and ammoniacal, the bladder becomes irritable, the patient is constantly straining to emit a few drops of urine, and, in like manner with the cystitis of the large prostate, the ureters and kidneys may eventually become involved.

The indications for treatment are tolerably clear. Remove the cause and the consequences will subside, either spontaneously or with the assistance that art can render. In the case of the large prostate this cannot always be done to the extent we could desire, at all events in those instances where the growth has been of a steadily progressive character. The obstruction, if it cannot be removed, may be largely remedied by the judicious use of the catheter. How and when the catheter is to be used must to a large extent be left to individual experience and discretion. Where cystitis is due to chronic organic stricture, it will be found to decline spontaneously as the obstruction yields to appropriate treatment. Week by week, as dilatation proceeds, the bladder loses its irritability, and the alkaline urine, perhaps ammoniacal and charged with mucus, resumes its normal reaction and appearance. The next indication is to prevent the contents of the bladder keeping up or adding to the inflammation which has already commenced. Offensive urine and tenacious alkaline mucus are in themselves sufficient elements for the production of inflammation irrespective of the obstruction in the canal. To correct this, and to remove excess of mucus, the bladder may require ablution, just as the nasal passages do when they are the seat of offensive ozœna. These details will be referred to when I come to speak of the process of washing out the bladder.

The acute cystitis of obstruction is a serious form of the disorder which is also seen in connection with stricture of the urethra and prostatic enlargement. These cases generally present themselves to our notice in the following way:—We are called to see a patient who has been suffering from stricture for some years; the difficulty has gone on increasing, the urine has become ammoniacal, and his rest is hourly disturbed to pass water, which he does in small drops after much straining. Broken down with all these symptoms he becomes feverish, his tongue is brown, and he exhales a sickly sort of ammoniacal odour. In addition, his temperature is high, pulse rapid and feeble, and he may have had a rigor followed by perspiration. Probably, with difficulty, a small catheter is passed, and some highly fœtid urine escapes. Both the general and local state indicate a condition of acute cystitis with inflamed kidneys. I have seen a good many cases of this kind, and about their treatment no doubt whatever can be entertained. The position is this: the patient cannot wait to derive the benefit of dilatation. No operation for the stricture, such as internal urethrotomy or a divulsion, is to be recommended, as the patient would be almost sure in his condition to die acutely pyæmic. The only way of dealing with him under these circumstances is to regard his bladder in the light of an acute fœtid abscess requiring an opening at its most dependent point. It would be just about as rational to propose to treat a fœtid ischio-rectal abscess that was poisoning a man acutely, by putting a trocar into it, as to think of relieving a septic suppurating bladder from obstruction with a catheter only. A grooved staff, or, failing this, anything to indicate to the finger the line of the urethra, should be passed, and a perinæal opening made into the membranous urethra to admit a large drainage-tube, in accordance with the directions given in the Eighth Lecture. The urine should not all be removed, if the catheter is first introduced, as it is as well to leave sufficient behind to fully realise the effect of the incision that is made. The bladder should be washed out and allowed to drain, as I have elsewhere described. In cases of the kind I am now referring to, where this course is promptly taken, I have seen patients pass as it were in a few hours from approaching death to rapid convalescence.

By this treatment I have here and there lost a dying patient, but, on the other hand, I know that I have saved many more who would otherwise have died. Subsequently the case may be treated, so far as the stricture is concerned, on the lines already laid down. The opening gives immediate relief, and if it is made to correspond in size with the drainage-tube to follow, there is really no bleeding or further trouble.

In the treatment of less urgent forms of cystitis, reference is often made to the reaction of the urine as indicating the necessity for administering either acids or alkalies. Our object should be to obtain that condition of the excretion which most nearly corresponds with its normal state, as we sometimes find that alkalies are poured in with a vigorous hand and regardless of the fact that healthy urine has an acid reaction. Still we must not forget that a highly acid condition of the urine is often intensely irritating to the inflamed mucous membrane with which it comes in contact. Sir George Johnson has shown the value of milk in some chronic cases of cystitis, and in others of skimmed milk. The pharmacopœia contains a number of drugs which seem to exercise a soothing or anodyne action upon the mucous membrane of the bladder and urinary organs generally; of these I would mention pareira brava, uva ursi, and buchu. Amongst the best demulcents are well made barley-water, the ulmus fulva or slippery elm, and the triticum repens. Belladonna and hyoscyamus are often extremely useful in allaying the irritability of the bladder associated with cystitis. There is a combination of the infusions of uva ursi and hops, with a little carbonate of soda added, the use of which will be often valuable in these cases. Of other drugs I have found serviceable in varying degrees and kinds of chronic cystitis, I may here mention hyposulphite of soda in half drachm doses; its virtue in purulent urine is sometimes remarkable. Salol, the syrup of tar, saw palmetto, salicylate of soda, pichi, and the fluid extract of the

Collinsonia Canadensis have also proved themselves of service.

Amongst fruits, the common blackberry appears to exercise a sedative effect on the mucous membrane of the urinary passages. My attention was first directed to this by two old practitioners who were in the habit of prescribing it in cases of chronic cystitis. I have often found blackberry-tea, prepared from the jelly, an efficient and not a disagreeable demulcent in these cases. There are other fruits and vegetables which will occasionally be found useful. For instance a distinguished member of our profession writes me: "It is a curious thing that when I eat gooseberries, not only is the urine increased in quantity but it is always clear and free from mucous deposit, and normally acid." The ordinary celery, well boiled, is often serviceable as part of the diet of persons liable to cystitis. I have, on the other hand, met with an instance where the eating of much asparagus invariably caused hæmaturia. An excess of mucous in the urine may sometimes be corrected by ten minims of terebene in a capsule three times a day, and the same may be said of a combination of oil of eucalyptus and cubebs. In the treatment of chronic inflammatory affections of the bladder many of the balsams and terebinthinates may be recommended. The use of saccharine has been also advocated for this purpose by Dr. Little,* of Dublin.

Opium must not be used indiscriminately. To give a few hours repose in this way to a patient who really requires his urine drawn off and the bladder washed out is on the face of it not good practice; though when such points have been attended to, it is often invaluable in removing the extreme sensitiveness of the parts which is due to the disease. The constipation that often follows the use of this drug in chronic sufferers from cystitis negatives the good otherwise gained by the sleep and repose that is obtained. The addition of belladonna to the opium sometimes removes the constipating effect of the latter. I cannot say that the bromides are of much service in this class of cases, unless the trouble arises more out of nervous than physical causes. Some persons' annoyances seem invariably to gravitate towards their large prostates.

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* *Dublin Journal of the Medical Sciences*, June, 1888.

Though, as a rule, retained and decomposing urine is the cause of the offensive smell sometimes noticed in these cases, still, in spite of catheterism and irrigation, a disagreeable odour will remain. Under these circumstances, the administration of naphthalin in a pill, containing two or three grains, enclosed in a gelatine capsule, will be found useful. If given three or four times a day the odour of the drug will be found to overcome the disagreeable one the urine generates. Benzoic and boric acid, benzoate of ammonia and chlorate of potash, administered internally, are also of service where the urine undergoes change of this kind. It is by sterilising the urine that medicines of this character do good.

To alleviate the extreme irritability of the bladder which often remains after the more active symptoms of inflammation have passed away, a solution of morphia, injected into the bladder with a gum-elastic catheter to which a ball syringe is attached, often gives the patient a good night after rectum suppositories in various forms have been tried.

For a similar object, I sometimes employ vesical suppositories, containing morphia, belladonna, bismuth, and other soothing agents. I put these into the bladder by means of a pessary-catheter, made for me by Messrs. Krohne and Sesemann. The instrument consists of a silver catheter, open at the end, in which the pessary is placed. By means of this instrument the whole of the urine is first drawn off, after which, by pressing the stylet, the pessary is projected into the bladder. The pessaries are made of the oleum theobromæ, and are so shaped as to fit in the open end of the catheter, thus giving it the appearance of an ordinary instrument, and facilitating its passage into the bladder. The shape of the pessaries is shown in the sketch (Fig. 69 A); they contain various medicinal applications. A grain of morphia, introduced into the bladder in this way, and repeated twice in the twenty-four hours, has completely relieved distressing symptoms of irritation. I have extended the application of these pessaries to other cases where astringents are indicated. A member of our profession writes me: "I have received more benefit from the pessaries of cantharides than from all the remedies I have tried during the twelve years I have suffered from retention."

Dr. Dennis, of New York, thus refers[*] to this method of medicating the bladder in a case of hæmorrhagic cystitis complicating typhoid fever:—

> "After the bladder had been washed out with the antiseptic solution, iodoform suppositories were introduced into the bladder by an instrument invented by Mr. Reginald Harrison. The antiseptic solution cleansed the bladder, and the iodoform suppositories disinfected the residual urine. It was a remarkable clinical fact, that eleven days after the discontinuance of the suppositories the odour of the iodoform was present in the urine."

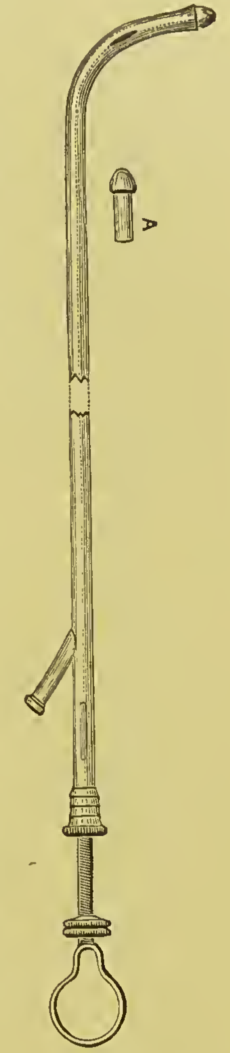

Fig. 69.

There are causes of cystitis other than those I have previously enumerated, as the commoner varieties. A paralysed bladder, as we see in disease and injury of the spinal cord, is, sooner or later, almost sure to become an inflamed one in the way that has already been explained. Catheterism and washing out the bladder will do much towards mitigating the distress of these patients and averting a fatal issue; for, where recovery has followed, much of the success was due to the absence of inflammation of the bladder. In employing catheterism in these cases, we ought not to forget that, owing to the absence of sensibility in the parts, much damage may be inflicted by an injudicious employment of instruments, without the patient expressing that consciousness of pain which otherwise he would do. The greatest care should consequently be exercised in drawing off the urine to avoid any lesion of the urethra or bladder, which, considering the state of the urine, would be sure to provoke further complications. Almost the whole comfort of the patient suffering from fracture of the spine depends upon the manner in which his urinary symptoms are anticipated and managed.

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[*] *New York Medical Record*, Nov. 28, 1891.

In connection with this subject, the following case* is of interest:—

Case.—C. R., a female, aged 30, was admitted into the Liverpool Royal Infirmary, under my care, on December 14th, 1884, having sustained an injury to the back, due to a fall down a railway cutting, a distance of seventy-five feet. On examination there was a swelling over the third lumbar vertebra. The vertebral spines could be traced from above downwards as far as the third lumbar vertebra, the spine of which was very prominent; below this there was a depression, the fourth lumbar vertebra not being within reach, and below this the fifth lumbar vertebra could be distinctly felt. There was no crepitus. The lower limbs were completely paralysed, and sensation was absent up to an ill-defined line at the upper part of the thighs. She complained of great pain in the back and down the legs. *There was retention of urine and incontinence of fæces.*

An anæsthetic having been administered, the shoulders were fixed and a broad strap was placed around the pelvis, from which extension was made by means of pulleys. During the operation the patient lay on her back, and gentle pressure was made over the third lumbar vertebra. This I felt distinctly go back, and at the same time the fourth vertebra slipped into its position. A saddle-shaped splint being fixed on the back, she was removed to bed.

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* *Lancet*, July 18, 1885.

On examination next morning the pain in the back and legs was absent; she could lift her right leg a few inches off the bed and move her left leg slightly. Sensation had returned to a great extent, especially in the right leg. There was no retention of urine or incontinence of fæces.

From this time the patient got gradually better without any bad symptoms, the muscular power and sensation in the right leg always being in slight advance over those of the left. The temperature was never higher than 100° F. The prominence in the lumbar region returned to a slight extent. She was kept in bed lying on her back with her legs extended until March 10th, 1885, when a plaster-of-Paris jacket was put on; and on March 12th she got up for the first time. She was very weak, but quickly improved, and on April 28th, 1885, was discharged, being able to walk about and do light work with perfect ease.

Perinæal cystotomy with tube-drainage has been practised in these cases by Mr. D. Harrisson, with the object of dispensing with catheterism altogether, but I have no experience of it myself under these circumstances. Mr. Wallis * also records an instance where perinæal cystotomy and drainage was practised, with temporary advantage, in a patient with fractured spine who was dying from cystitis. The use of the catheter was thus rendered unnecessary. I can, however, endorse the remark made by the late Dr. Hilton Fagge, that the tendency of urine in paraplegia to putrefaction may be checked by the administration of salicylic acid by the mouth.

There are cases of chronic cystitis in the male where the expediency of performing cystotomy, and draining through

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* Cambridge Medical Society, *Lancet*, Feb. 21, 1885.

the perinæum, may with much propriety be considered for the purpose of giving the bladder a complete rest, both from the operation of catheterism as well as from its own irritable contractions or spasms. In some instances, where all other means have been tried and failed, very satisfactory results have been obtained; that is to say, the patients have derived permanent advantage. This matter has, however, been already discussed in connection with the operation of perinæal puncture and drainage.

Atony of the bladder is often seen in connection with cystitis. When occurring suddenly, the question sometimes arises, Should a catheter be permanently retained in the bladder? My opinion corresponds with the following remark by the late Mr. W. Hey, of Leeds: "I feel sure that a patient sooner regains the power of emptying his bladder spontaneously when the catheter is withdrawn after each time it is used than when it is retained." Temporary atony is sometimes seen following pressure from over-retention of urine, just as the arm may be temporarily paralysed by lying on it. To prevent atony becoming permanent much may be done by the mechanical measures that have been advocated. In addition, medicines such as iron, nux vomica, and strychnia have proved useful. The tincture of cantharides is an old-fashioned remedy, which, in addition to its diuretic properties, probably exercises a direct stimulating action upon the bladder by its presence in the urine. Von Langenbeck has found benefit from the hypodermic injection of ergotin. The propriety of emptying the atonic bladder either rapidly or by degrees has been already discussed in connection with the treatment of retention of urine.

Care must be taken to draw a distinction between the inflamed bladder that is either entirely or partially atonied because the patient is ataxic, and the commoner form of local paralysis to which reference is here made. Inflammatory atony is not unfrequently seen as a remote consequence of syphilis in middle-aged men. Here both local and general treatment will be requisite. Atony with cystitis, though associated with urethral stricture, is sometimes due to a central and not a peripheral cause; hence it is well not to promise too much even after the stricture has been disposed of. I have known the bladder treated somewhat actively, with the view of arousing its supposed dormant action, where attention should also have been devoted to the state of the nerve centres, which was the primary cause of the suspended action in the part.

In the following case reference is made to the treatment of ataxia by suspension, so far as the bladder symptoms seemed to be influenced by the process :—

Case.—A male patient, aged about 40, came under my care early in 1890, with locomotor ataxia of two years' duration. He had difficulty in commencing to pass water, which was increasing, with cystitis and ammoniacal urine. Under Charcot's advice it was agreed that suspension should be tried in conjunction with the administration of ergot. I completely suspended him on fourteen occasions in two months, from sixty to ninety seconds at a time, with the result that the bladder symptoms entirely subsided, and the patient was able to resume active official duties. The patient had no stricture and no urethral instrument was used.

In the treatment of cystitis, as it occurs in females, you can have no better instructions than those contained in a practical paper by Dr. J. Braxton Hicks. The author points out how little is to be expected from internal remedies, beyond correcting such abnormalities as the diseased state of the urine and disorder of the functions generally, and how much may be done by local treatment. Reliance is chiefly placed upon washing out the bladder with slightly acidulated warm water until it is clear of phosphates and mucus, and afterwards injecting, with a view of its retention, a solution of morphia. Subsequently permanganate or chlorate of potash is employed in similar manner. On the subsidence of the acuter symptoms, injections of tannin or of perchloride of iron, followed by morphia, are substituted, and are again changed, as the bladder becomes less sensitive, for more potent astringents, such as nitrate of silver. "The benefit of such management is very marked in cases of paralysis where, from retention or the rapid ammoniacal decomposition of the urine, the pain and constitutional irritation are very distressing; and thus we can often lessen the chance of the extension of the irritation to the kidneys. Again, in malignant disease, the simple injection of acidulated warm water gives amazing comfort, removing the phosphates and ammonia, and when to this is added the morphia, a wonderful comfort is felt. Indeed, so much relief is obtained that, with a large calculus in the bladder, its presence is almost entirely unfelt if morphia be daily injected."*

There are in women forms of chronic cystitis and vesical irritability of a very obstinate nature where it is difficult to detect any structural alterations. In some of these cases, Mr. Teale† has shown that great benefit follows inducing a condition of transient incontinence of urine by the over-dilatation of the urethra. This is a mode of resting the bladder which, like others where a temporary vesico-vaginal fistula is established by incision, may with advantage be employed in obstinate cases of the kind referred to. As I have said before, for the sympathetic or local irritation alone, which so frequently attends urinary tuberculosis, I have not met with such results in my own experience as would make me commend this principle of proceeding. The reflex irritation of urinary phthisis is best met by anodynes.

In all cases of chronic cystitis, whatever may be the cause, the practitioner should be alive to the possibility of a phosphatic stone forming. These concretions sometimes form with great rapidity, and when detected are apt to lead the patient or his friends to suspect that the stone, which perhaps someone else detected, was the cause and not the consequence of the disorder undergoing treatment. I have on several occasions known phosphatic stones, of, say, an inch diameter, form in a few weeks.

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* *British Medical Journal*, July 11, 1874.

† *Lancet*, vol. ii., 1875, and vol. i., 1876.

By the kindness of my colleague Mr. Heycock, I had the opportunity of seeing, in his practice at St. Peter's Hospital, a case of much interest and importance. It was one of acute cystitis in a man of about 40, with a urethral stricture of some standing, where the entire mucous membrane of the bladder exfoliated and was withdrawn in the form of a loose bag through a perinæal cystotomy. The latter was rendered necessary by the fœtid character of the urine and the recurrence of retention from impaction of the detached membrane in the outlet from the bladder. A drainage-tube was placed in the bladder through the wound. Immediate relief followed the operation, and the patient rapidly progressed towards recovery. The mucous coat, as shown in the drawing of the specimen (Fig. 70), had a granular appearance, and was much roughened by the deposition of phosphates upon it.

These cases are, it is hardly necessary to state, widely different from others where a false lining or membrane appears to form within the bladder, and keeps up a cystitis. Dr. Cabot, of Boston, U.S.A.,* reports such a case, where, on opening the bladder above the pubes to relieve urgent symptoms, it was found "that a thick membrane could be detached from the diseased surface, and with care could be peeled off with the fingers in sheets of one or two square inches area. It was loosely attached, and after removal left a smooth surface which bled but slightly. The wall of the

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* "A Case of Cystitis with the formation of a thick Epidermial Sheet in the Bladder,—Pachydermia Vesicæ." *American Journal of the Medical Sciences*, February, 1891.

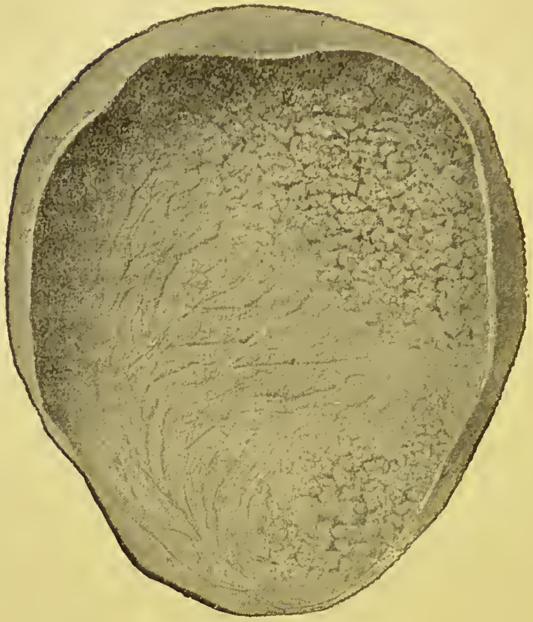

Fig. 70.

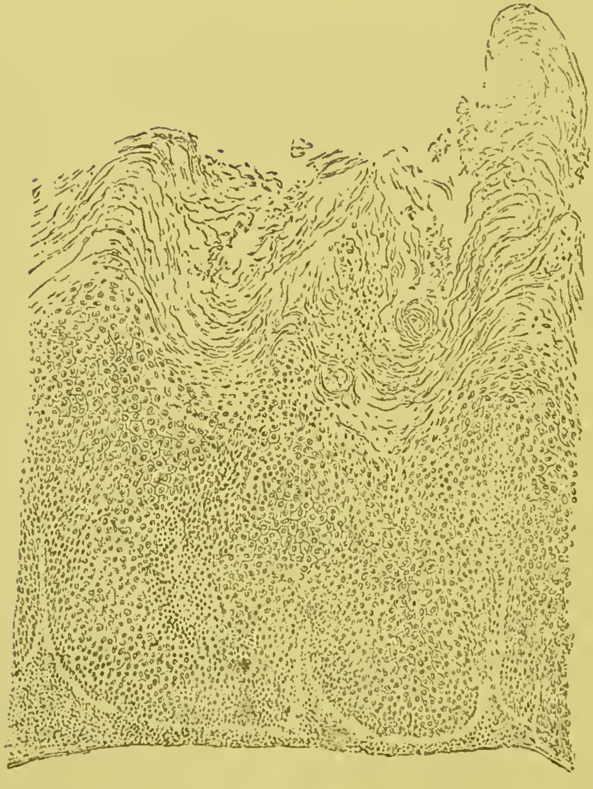

Fig. 71.

bladder which it left felt soft and supple." The patient steadily improved, and the following year it is stated he was able to resume hard work. Pathologically the membrane is illustrated (Fig. 71) and described as "made up entirely of epithelium, from fifty to one hundred times as thick as the epithelial layer normally existing on the bladder wall, and its nourishment was provided for by papillæ thrown up by the connective tissue below." Referring to treatment, other than by operation, it is observed that nitrate of silver injections in allaying inflammation seemed to answer. Dr. J. P. Bryson suggested that, as he had had excellent results in the treatment of chronic cystitis from injections of salicylic acid, this drug would be applicable here, as it had the power of removing warts, corns, and other growths of hyperplastic epithelium. Dr. Cabot expresses his acknowledgments to a paper by Posner, upon "Dermoid Changes in Mucous Membranes,"* for the pathological consideration of the subject. In a case I saw recently, in conjunction with Mr. T. P. Teale, a very similar state of things was found on opening the bladder above the pubes. Mr. Teale thus describes it in a letter to me: "The condition of the bladder was such as I never experienced. The whole of the mucous membrane was in a velvety or granular condition, and was almost completely lined by a membrane (diphtheritic?) like soft writing-paper. This membranous material seemed gradually to disappear in the course of a week or two. I had a good view of the neck of the bladder through a small Ferguson's uterine speculum. It was fringed by feathery warts or elongated papillæ, a greater part of which I removed by forceps and scissors." In another case I am now seeing, portions of tissue corresponding with what is referred to here are from time to time exfoliated, with slight hæmorrhages, but in all other respects the gentleman is in excellent health.

Cases of cystitis complicated with calculus or growth will be referred to again later on.

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* Virchow's *Archiv*, vol. cxviii., 1889.

TWENTY-THIRD LECTURE.

The Mechanism and Materials for Washing Out the Bladder.

After the general consideration of cystitis, I shall now refer to what may appropriately be called the toilet of the bladder. This will include, first, the mechanism, and then the materials appropriate to each class of case. In the first place, it is well to remember that the process of washing out some bladders is a very different thing to what it is in others. This will readily be understood by comparing a pouched bladder (Fig. 51) with a tolerably normal one (Fig. 47). In the former case, unless the syphon-action of the catheter is perfect, a considerable amount of urine, perhaps loaded with mucus or pus, may be left behind to decompose and become swarming with bacteria. Hence the catheter should be gently moved about and partially withdrawn as the flow ceases, to see if another collection of urine can be tapped. As I have elsewhere stated, in some instances it is even well to let the patient lie on his side, so as to render the abdomen somewhat dependent, before the catheter is finally withdrawn. It can be seen on reference to Fig. 51 how a metal catheter may positively shut down a valve by its weight, and render, from the position of the exit aperture, the complete emptying of the bladder an impossibility.

For ordinary purposes, I usually employ a soft silk or rubber catheter with a bevelled eye, and a rubber bottle holding four or six ounces of fluid, with a brass nozzle and stopcock, which can easily be screwed on, or, what is better, connected with a bayonet joint (Fig. 72). The nozzle should taper to a fine point so that it may fit catheters of various sizes. I formerly used double-current metal catheters, but these I have discarded, for the reasons that an unyielding instrument is not so generally applicable as a flexible one, and because there is no object in having an arrangement for the synchronous flow of fluid into and out of the bladder at the expense of the calibre of the tube. The soft catheter having been introduced, and the rubber bottle filled and connected with it, the fluid is gently pressed by the hand onwards to the bladder. Two or three ounces usually suffice for a time, the tap is again turned and the fluid retained in the bladder

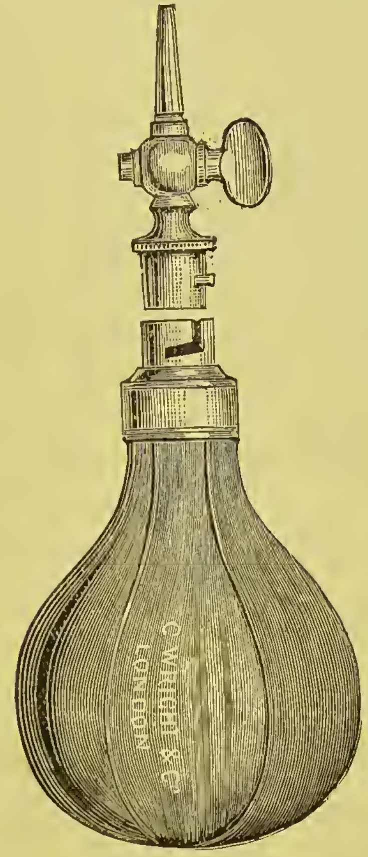

Fig. 72.

for a few moments, and then allowed to escape. This process may be repeated two or three times until the return fluid indicates that the object intended has been attained. The process should be a painless one, without provoking either bleeding or spasm. Mr. Buckston Browne* has described a tube which can be fitted to almost any catheter, by which a Higginson's syringe may be adapted for filling the bladder, whilst, by raising the finger from over one of the openings, the current is reversed and the fluid ejected.

I used to wash out with a glass funnel, to which about two feet of rubber tubing and a catheter were fitted. When the funnel is elevated and water poured into it, the latter by hydrostatic pressure proportionate to the calibre and length of the tubing flows into the bladder, and by lowering the funnel below the level of the patient's pelvis escapes. For self-use, patients generally prefer the rubber bottle and catheter first described.

Where the bladder is much pouched or irregular in shape, it is better to employ hydrostatic pressure in the form of a reservoir or rubber bag (which is convenient for travelling), as shown in Fig. 73, representing an arrangement described by Dr. Keyes. By this plan the bladder can be very gradually filled, so as to float out of these various depressions and crevices pieces of tenacious mucus which otherwise would remain behind and keep up irritation and bacterial decomposition. From the sketch (Fig. 73) it will be seen that the apparatus consists of a rubber bottle (A), capable of holding a pint of fluid, which can be suspended to any convenient hook; a piece of tubing (B), five feet in length, terminating in a stopcock (C), which permits fluid to flow either through the catheter end (D) or the outlet pipe (E), according to the direction in which the tap is turned. A conical metallic catheter mouthpiece (F) completes the connection with the catheter (G). A soft rubber catheter is generally preferred. The instrument is used in the following way: The bag or reservoir being filled with the fluid to be injected, is hung up about six feet from the floor. The stopcock (c) is then turned until some of the fluid escapes, so that no air is allowed to enter the bladder. The patient, being in the erect position, then introduces the catheter and connects it with the tubing. By the alternate action of the tap (c) the fluid is made either to enter the bladder or to escape; if the latter, it passes into the receptacle (H). The instrument can be adapted to the recumbent position, and also enables patients to readily perform this operation without assistance.

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* *Lancet*, Oct. 18, 1884.

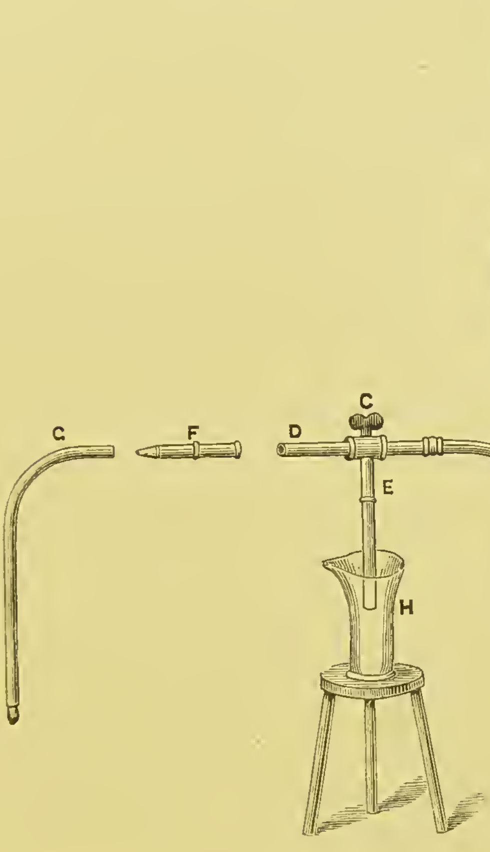

Fig. 73.

Care should be taken to avoid forcing air into the bladder when the urine contains blood or pus, as it sometimes leads to putrefaction and the evolution of gas, which may cause retention. As the bladder is expelling the last portion of the injection, if the surgeon is holding the catheter, he sometimes feels a slight click or concussion, which the patient with a sensitive bladder is conscious of and would rather avoid. I believe it is caused by the mucous membrane being drawn into the eye of the catheter as the bladder is emptied of the last few drops. It is prevented by watching the flow, and withdrawing the catheter until the end is well within the prostate as the last portion of fluid escapes. Catheters for this purpose should have the opening of moderate size, with the edge bevelled, so as not to scratch the urethra; to avoid more of the catheter being introduced into the bladder than necessary, the opening should be close to the end of the instrument. When using rubber bottles for washing out the bladder care should be taken that they are thoroughly aseptic and not structurally disqualified from age. I am induced to make this remark by the following account I received from a medical friend who, in reference to an attack of cystitis, writes in explanation: "Here is a bit of the 'old bottle' I used in washing out my bladder. If you rub its inner surface in the slightest way you at once detach a quantity of granular matter, and the same if you wash it. I more than suspect that putting my 'new wine' into my 'old bottle' was the cause of the cystitis." Care should be taken in seeing to points such as these.

We have, I think, been disposed to make this excellent practice of irrigation a fashion in bladder cases where, though there may be a call for the catheter, the ablution following may prove unnecessary. In some cases of partial retention where the catheter is required, it must not be forgotten that so long as the vesical mucus is normal in quantity and quality, it serves a purpose in protecting a surface, which, by reason of the inequalities of the bladder, arising out of enlargement of the prostate, has no means of completely contracting or covering itself until time has elapsed for the excretion of the requisite amount of residual urine. I am reminded of this when I hear patients complaining of irritability of the bladder, which takes a little time to subside, directly after they have been washed out.

Washing out is required for various purposes, most commonly for the removal of mucus or muco-pus, which often collects in the dependent parts of the bladder, especially where the prostate is large. If left to accumulate, this viscid secretion excites spasm and causes ammoniacal decomposition of the urine, thus adding considerably to other sources of irritation. I know of no better solvent for this than common salt, in the proportion of a teaspoonful or so to a pint of tepid water, for use with an irrigator. In connection with this remark Dr. Gouley* has pointed out that bladders which have long contained purulent, slimy urine do not bear the contact of limpid fluids of low specific gravity well at first, and it is therefore necessary in some instances to artificially increase the density of the water. Such a lotion is less irritating to the mucous membrane than plain water, as we recognise in the treatment of ozœna. In other instances, a solution of boracic acid answers better. Very hard waters should not be used for such purposes. It is just as easy "to chap" the bladder in this way as the hands. Distilled or rain water may be substituted.

The next class of cases includes those where the contents of the bladder are rendered offensive by decomposition. We know how disagreeable the urine can become both to the patient and to the practitioner. Carbolic acid will be found an appropriate antiseptic, but it must be used not stronger than one in eighty, otherwise, if it becomes absorbed, it may occasion that peculiar condition known as carboluria. Solutions of sanitas, boro-glyceride, and sulpho-carbolate of soda may also be employed for the same purpose. Resorcin, creolin, and nitrite of amyl are also recommended as useful disinfectants. Where the urine remains purulent after cystitis nothing often succeeds better than a quinine wash, as first recommended by Mr. Nunn,* who speaks of its action as a bactericide. The neutral sulphate should be used in the proportion of two grains to an ounce of distilled water, and if the solution is not quite clear, a drop of dilute muriatic acid may be added. Some of the injection may be left in the bladder. The internal administration of quinine, in doses of five grains, not only acts as a sedative to the bladder after cystitis, but is useful in sterilising the urine. Its efficacy for this purpose has been urged by Dr. Simmons,† who, in explaining the nature of this action, refers to an observation by Dr. Kerner, that seventy per cent. of the drug is eliminated by the kidneys in from three to twenty-four hours after it has been taken. Quinine is employed in this way after operations on the urethra, with the best results. It sometimes happens that after attacks of cystitis the urine remains alkaline, and there is a tendency to throw down phosphates, which often concrete in the form of a mortar-like substance. From five to ten grains of citric acid in a pint of warm water, used as an injection, will often correct this disposition, which is probably primarily due to excess of vesical mucus. The mineral acids are not borne well locally.

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* *New York Medical Journal*, Nov. 1, 1890.

Sir William Roberts ‡ has suggested that the lactic fermentation may be made use of as a counter-septic agent in cases of ammoniacal decomposition of the urine, and that thus the formation of phosphatic concretions may be prevented. As this subject will be discussed later on in connection with the circumstances under which stone forms and recurs in the bladder, I shall not make further reference to it here. It may, however, now be remarked that I have availed myself of this suggestion with obvious advantage in some cases of ammoniacal urine where there was every disposition to form stone. For this purpose, as a preliminary, the bladder has been washed out with a solution of citric acid in the proportion of ten grains to a pint of tepid water. After this had been done, an ounce of water containing a drachm of malt extract (Bynin) was injected into the bladder, and retained there.

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* *Lancet,* Feb. 23, 1878.

† *American Journal of the Medical Sciences,* April, 1879.

‡ *Lancet,* Feb. 25, 1893.

The mucous membrane sometimes remains sensitive after the acuter symptoms of inflammation have subsided, when a soothing or anodyne solution will be serviceable. For this purpose a solution of borax in glycerine, with tepid water added, makes a good wash. Sir Henry Thompson's formula is as follows*:—Glycerine, two ounces; biborate of soda, one ounce; dissolve, and add two ounces of water; half an ounce of this solution to four ounces of warm water is a suitable proportion. Some of the most troublesome cases of irritable bladder, arising from this cause, entirely yield to the daily use of a solution of bismuth. A tablespoonful of the lac bismuthi (Symes & Co.) to six ounces of warm water represents an appropriate strength. As a local application I have found this salt as useful in bladder affections as it appears to be in other disorders of the mucous tract, where it acts mechanically in protecting or coating over the irritable membrane. Other cases of this kind yield to irrigating the bladder with tolerably hot water. You may commence with it at 98° Fahr., and gradually increase the temperature to 115° or 120° Fahr. The late Mr. Guthrie referred to the value of this treatment in these cases.†

In tubercular ulceration of the bladder no application is so useful as a wash of corrosive sublimate; under its use as an antiseptic I have known the bacilli disappear from the urine and the ulcers heal. It must be used in a dilute form; one in 20,000 parts is strong enough to begin with. In operations on the interior of the urethra, where a wound is inflicted or the canal is abraded, I generally leave an ounce or two of this solution in the bladder so as to act as a protection to the sore by sterilising the first portion of urine that is passed, and connect immunity from rigors and fever principally to this practice. For the same purpose, in tubercular ulceration of the bladder, a solution of iodoform in mucilage, in the proportion of five grains to an ounce, is used, and I have frequently seen good from it, but the offensive smell of the drug is an inconvenience. In free hæmorrhage from the bladder, injections of hazeline and hot water have proved of service, but as a rule the less we interfere instrumentally in these cases the better. To wash out a clot causing irritation to the bladder there are no better means than warm water and Clover's catheter and suction bottle for withdrawing *débris* after lithotrity.

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* *Diseases of the Urinary Organs.*

† *On the Anatomy and Diseases of the Bladder.*

When washing out the bladder care should be taken to examine the fluid employed in the process, when expelled, by putting it into a glass receptacle. So long as flakes or masses of mucus and lymph are seen we have evidence of material existing which can cause and maintain bacterial life. Further, the microscope shows that such products of inflammatory action going on in the bladder are capable of acting as minute foreign bodies, and furnishing nuclei upon which phosphatic concretion may take place. Especially is this precaution necessary after a stone has been removed from the bladder.

TWENTY-FOURTH LECTURE.

Sinuses connected with the Bladder and Urethra not arising out of Stricture.

Under this heading will be considered a variety of cases where sinuses have formed in connection with the bladder and urethra, but not necessarily in consequence of urethral stricture. In the latter case stress was laid on the fact that it was useless to expect the fistula to close so long as the obstruction to the escape of urine along the natural channel remained. In the examples that will now be reviewed there is no such common ground of this kind; on the contrary, in each instance we shall find some exceptional circumstance upon which the continuance of the sinus depends.

Looking over these cases of sinus or fistula they will permit of being grouped in the following way:—

(1) As between the bladder and the intestines. (2) In the supra-pubic region leading to the bladder. (*a*) Arising from abscesses. (*b*) Arising from supra-pubic punctures or incisions. (3) As connected with the bladder, but opening externally in other directions than in the preceding. (4) Between the bladder and vagina (vesico-vaginal fistulæ). (5) Leading from the bladder into the rectum through the prostate or trigone. (*a*) Consequent on prostatic abscess. (*b*) Following puncture of the bladder from the rectum, or other similar proceeding. 6. Sinuses leading from the urethra into the rectum following lithotomy, prostatotomy, and urethrotomy.

Class 1.—Fistulous communications between the bladder and intestines of a non-malignant character may be caused in three ways:—

(*a*) By the passage of foreign bodies from the intestines into the bladder: these have been referred to in the Fourteenth Lecture.

(*b*) By various kinds of non-malignant ulcerations, such as tubercular or dysenteric, proceeding from the intestine into the bladder, and, more rarely, from the bladder towards the intestines.

(*c*) By abscesses in relation with the abdominal viscera.

Non-malignant sinuses between the bowels and bladder vary much in degree, and these differences will, to a certain extent, serve as indications for treatment. The symptoms are usually these: more or less fæces and flatus find their way into the bladder, and if the sinus is sufficiently low down, as in the sigmoid flexure or rectum, urine may be passed in considerable quantities, either pure or mixed with fæces, by the anus. As a rule, these symptoms are the more marked when there is diarrhœa or flatulent dyspepsia; in fact some persons only suffer when the bowels are much disturbed. One patient describes his consciousness of the passage of air from the bladder when micturition closes with a slight fizzing sound, such as a soda-water bottle gives off. In another instance, the entrance of air into the bladder sometimes occasions an acute attack of vesical colic; and cases are recorded where intestinal worms have thus entered the bladder. In this extract, Dr. W. D. Kingdon, of Exeter, sums up the particulars of a case which was reported and illustrated *:—

Case.—The calculus (figured) on being carefully divided displayed in its centre a large pin, which satisfactorily accounts for the singular appearances detailed. The poor boy must have swallowed the pin, which, after traversing the small intestines, formed a lodgment in the appendix vermiformis; here the irritation caused by it must have given rise to inflammation and adhesion of the process to the exterior of the bladder, and subsequently by ulceration to the passage of the pin into the urinary bladder, where it formed the nucleus of the calculus discovered after death, though not detected during life. The fistulous communication with the bladder will likewise account for the voiding of the urine from the anus, the natural orifice being closed by the calculus; and also for the passage of the worms through the urethra on the several occasions mentioned.

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* *Transactions of the Provincial Medical and Surgical Association*, vol. x.

The following illustrations are selected from a communication I made upon the subject * :—

Case I.—A man, aged 58. Ten years before I saw him he was laid up for some weeks with acute pain in the lumbar region, which resulted in the discharge of pus into the bladder and its escape with the urine. On the sudden appearance of purulent urine the pain in the back ceased and he rapidly convalesced. It was suggested to him at the time that an abscess was probably connected with the kidney, but I could find no evidence of this. On going about again, after this attack, he noticed the sputtering of air at the close of micturition, and this at times has continued ever since, but has caused him no further inconvenience. The particular symptom about which I was consulted was the occasional discharge of a colourless fluid from the rectum independently of defæcation. I did not see any of the fluid, but it was sufficient when it occurred to moisten the linen, and thus to make the patient uncomfortable. On examination of the rectum with the finger and speculum, I could not detect anything abnormal except a little irregular enlargement of the prostate, but not such as is usually met with in ordinary hypertrophy of this part. The urine was normal in composition, but contained a slight deposit which microscopic examination showed to contain elements of muscular tissue and vegetable fibre.

Case II.—I saw a man in 1887, aged 50, who two years previously suffered from some obscure abdominal symptoms in the

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* *Transactions of the Medical Society of London*, vol. xiv.

region of the bladder, attended with acute pain, since which he has noticed fæculent matter in the urine and the discharge of air at the close of micturition. Examination of the rectum disclosed nothing worthy of note further than that I was able by pressing on the prostate and posterior wall of the bladder to make urine mixed with fæculent matter exude from the orifice of the penis. In all other respects this patient seemed to enjoy excellent health, and there was no evidence pointing to malignancy. I have seen him on two or three occasions since in consequence of his suffering from an acute paroxysm of pain over the region of the bladder. Each time I found the pain was due to the blocking of the prostatic urethra with a hardened nodule of fæces and the rapid distension of the bladder with air. Immediate relief was given by passing a catheter, which afforded vent to some fæculent urine and a large amount of pent-up gas. This patient's symptoms were always intensified when diarrhœa was present. Though much annoyed at times by these local symptoms, he continues, I understand, to enjoy good health and to lead an active life.

Case III.—A man, aged about 60. His last illness commenced a short time before I saw him with intense pain down the course of the right sciatic nerve, which lasted for rather more than a week; then retention of urine supervened from enlarged prostate, in addition to some urethral stricture which necessitated daily catheterism. In the course of a few days the pain in the back and leg entirely ceased, coincident with the appearance of pus in considerable quantity in the urine. The urine as soon as it became purulent was rendered most offensive, in spite of the bladder being washed out with disinfectants. He appears to have experienced some difficulty in urinating for several years, a circumstance which was probably due to the contraction in the urethra. He had not lost flesh, and there was no evidence that seemed to point to the presence of malignant disease. He had always led an active life. The urine continued to be horribly offensive, as large quantities of gas and fæces were constantly mixed and discharged with it in spite of all the means that were used. He remained much in this way for about two months after I first saw him, and then lapsed into a comatose state, from which he never rallied. He was unwilling to submit to such operative measures as were proposed for his relief. The patient stated that when he was about 20 years of age he suffered from an abdominal abscess of some kind, when it was believed that a communication had taken place between the bladder and intestines, as pus, and what he thought was fæculent matter had been at times discharged with the urine, but never sufficiently to cause him inconvenience. He had occasionally passed air at the close of micturition, which he likened to the expiring efforts of a syphon soda-water bottle. In all other respects he appears to have enjoyed good health. His urine was on several occasions kindly examined for me by Sir William Roberts, and showed unmistakable evidence of intestinal contamination.

I am indebted to Mr. Weston, the surgeon with whom I saw the case, for the following particulars of the autopsy. The examination was only of a partial character. There was an opening near to the top of the bladder, looking as though it had always existed, lined with mucous membrane, not patent but contracted, and much resembling a miniature anus. No. 8 catheter passed easily through it into a cavity fairly well surrounding the descending colon. This cavity, or rather the walls of it, were firmly adherent to the surrounding parts, and were with great difficulty separated. The cavity contained no fæcal matter, but was rough from inflammatory products, and rotten in appearance. There were several openings from this cavity into the intestine, but in the hurry of making the examination the intestinal connections were a good deal disturbed. The colon took an unusual course; instead of passing down into the left loin, it curved across the lower part of the abdomen in front of the small intestines, and disappeared a little to the right side and under the bladder to its termination in the anus.

In reviewing cases of this kind, more particularly in reference to the question of treatment, we can divide them into two classes: (1) those where the inconvenience resulting is so slight as would hardly warrant the adoption of any important surgical interference; and (2) those where the inconvenience is an increasing one, either by a gradual process or by the intercurrence of acute symptoms, or where the condition of the bladder by decomposition of the urine becomes such as to seriously jeopardise the health of other parts of the urinary apparatus, especially the kidneys. I think it will be found that the cases quoted illustrate in some degree these deductions.

In reference to the first variety there can be no doubt that persons live for many years and enjoy good health who are liable to the escape of gas and fæces in this way. I have had the opportunity of examining some of those cases which have been described under the term pneumaturia, implying that the urine or other secretion connected with the urinary apparatus had undergone some form of change by which gas was evolved, and either expelled or temporarily retained. I have no hesitation in stating that they were all instances of vesico-intestinal fistula. It has been urged that air is met with in the urine in certain cases of glycosuria, and Dr. Guiard proposed the term "diabetic pneumaturia."* I am not aware, however, that this observation has been confirmed. Cases where the communication between the bowels and the bladder is evidently small, and is not increasing, may be kept in good health by careful attention to digestible diet, and by restraining a tendency to diarrhœa, which invariably aggravates any special symptoms they may present.

Passing to the second class of cases, where the communication becomes gradually or suddenly enlarged, or where the urine is rendered so foul as to jeopardise the kidneys as well as other portions of the urinary tract, it is clear that some mechanical expedient in the shape of an operation must be considered. To effect any permanent good under such circumstances, it is obvious that the flow of fæces into the bladder should be prevented by causing them to escape by an artificial opening above the point where they are poured into the bladder, and thus to give the false passage a chance of contracting and closing. This is a proposition which, on paper, is an easy one to make, but in practice may be a difficult one to decide upon. It must not be overlooked that in many cases of vesico-intestinal fistula which appear to have taken their origin in an inflammatory condition, such as in several recorded by Mr. Harrison Cripps,* the viscus involved with the bladder was some portion of the small intestine. Taking, however, everything into consideration and the probability of our being able to distinguish when the latter is implicated, on the necessity arising, it is the safest practice to make the opening as high up in the large bowel as possible, and this will lead to the selection of some portion of the right ascending colon. In the last instance related I was much disposed, considering the condition of the patient, the state of his bladder, and the uncertainty as to where the false opening was, to give that immediate and safe relief which a supra-pubic opening into the bladder could have afforded, and be guided as to the future by what this would have enabled the eye as well as the finger to discover.

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* *La France Médicale*, vol. i., 1883.

Whenever there are signs of fæces entering the bladder, care should be taken that washing out the viscus is employed, otherwise a concretion may be formed, as in a case recorded by the late Mr. Charles Hawkins.† I assisted Mr. Hakes, in 1869, to operate on a case where the patient lived for five years and returned to his employment, subsequently dying of renal disease. I refer to it particularly, as opportunities of making an examination of the parts at a considerable interval of time after the operation are not very frequent.‡

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* *On the Passage of Air and Fæces by the Urethra.* Churchill, 1888.

† *Transactions of the Royal Medical and Chirurgical Society*, 1858–59.

‡ *Liverpool Reports*, vol. iii., 1869. *Liverpool and Manchester Reports*, vol. iii., 1875.

Case.—The patient, a man, aged 20, with no history of syphilis, was admitted into the Liverpool Royal Infirmary in 1869 suffering from the passage of fæces and flatus into his bladder. He was in a very miserable condition. He appears to have had some history of difficulty in passing his motions for three years previously. The rectum was unhealthy from ulceration, and a sound could be passed from the bladder into the bowel. Left lumbar colotomy was performed, and the patient made a good recovery. He resumed his employment as a 'bus conductor, and for over three years enjoyed perfect health and suffered but little inconvenience from his artificial anus. Then he appears to have fallen ill, and was readmitted into the Infirmary in 1874, where he shortly afterwards died from renal disease. He never had any return of his vesico-intestinal fistula. The *post-mortem* examination was made by the late Dr. Michael Harris, who attached a drawing of the part to the published records of the case. It is sufficient here to state that the colon from the artifical anus to the bladder was obliterated and converted into a coil of fat: the fistulous opening from the rectum into the bladder was also soundly closed, nothing but some old cicatricial tissue remaining. The patient died from uræmia as a result of degeneration of the kidneys. No further light was thrown on the nature of the old ulceration by which the bladder and bowel had been made to communicate other than to demonstrate its non-malignancy.

Ulcerations proceeding from the bladder towards the intestines are much less common than the preceding, and are liable to be followed by fatal results before the communication has had time to assume the characteristics of a chronic sinus. Belonging to this class is the case recorded by the late Mr. T. H. Bartleet, of Birmingham, where a perforating ulcer of the bladder made its way into the ileum and caused death, as it were accidentally, by setting up peritonitis.* The ulcer, whilst confined to the bladder, appears to have gone through all its stages without presenting any symptoms, and whilst the patient continued to follow his accustomed occupation. A sudden lifting movement, which occasioned acute pain, probably broke down a recent adhesion between the bladder and bowel, and led to extravasation of urine, which caused death.

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* *Lancet*, Feb. 5, 1876.

Class 2.—Sinuses in the supra-pubic region leading into the bladder. These are of two kinds—(*a*) arising from abscess; (*b*) from wounds, surgical or otherwise. Abscesses in the supra-pubic region may be confined in the space known as the porta vesicæ, and eventually open both into the bladder and externally, though they are apt to burrow considerably, and thus prove difficult to heal. Sometimes they are connected with caries of the pubic arch, or with disease of the symphysis. In the following case the course and treatment of these abscesses is illustrated:—

Case.—In 1885 I saw, with Dr. H. W. Knowles, a female aged about 20, under the following circumstances: Fifteen months previously she had some swelling and pain about the left groin. Three months before I saw her an abscess formed above the pubes, which was opened externally, and found to communicate with the bladder. A sinus formed, which resisted all efforts to close it, including continual catheterism. When we saw her in consultation, the abdominal parietes were undermined, and urine welled up through the opening when the catheter was removed. It was advised that the sinuses should be opened up and the catheter again worn. This was followed with improvement, but when the catheter was removed urine still escaped by the wound. Then we found, on further examination, that the urine had burrowed under the attachment of the left rectus muscle. This we divided close to the pubes, when the wound soundly healed.

Wounds and punctures made into the male bladder above the pubes, either accidentally or for surgical purposes, usually heal when there is nothing in the condition of the prostate or urethra to interfere with the escape of urine by the natural passage, though they are sometimes tedious. Where there is a urethral stricture this must first be treated. A discharge of urine from the umbilicus, due to a congenitally unobliterated urachus, is occasionally met with. If there is any obstruction in front, such as a phimosis, or a contraction in the urethra, this should be removed, and then an endeavour may be made to close the sinus by cauterisation, or a plastic operation may be attempted.

Class 3.—Sinuses connected with the bladder opening externally in other directions than those specified. These sometimes take long and tortuous courses. In a case where Mr. Bickersteth successfully removed, at the Liverpool Royal Infirmary, a large oxalate stone by the supra-pubic operation over twenty years ago, the only prominent symptom was a sinus discharging urine which opened near the great trochanter. Some remarkable instances are recorded, chiefly in the practice of military surgeons, where fistulous communications with the bladder have been caused by gun-shot injuries, and maintained by the lodgment of portions of the missiles and clothing or of bone within the viscus. Unless there has been an extensive breach of surface these openings have usually healed on the removal of the cause. Cases of this kind point to the necessity for a careful examination of the bladder in all instances where a discharge of urine by the wound indicates that a fistulous communication exists. Abscesses connected with the bladder within the pelvis sometimes give rise to long sinuous tracts through which the urine escapes. In a case I have recently seen, the whole of the urine was discharged through an opening half-way down the front of the thigh. I gave some relief by establishing a supra-pubic fistula, but as the case was a malignant one, the benefit the patient derived was only temporary.

Class 4.—Sinuses between the bladder and the vagina. These are more generally known under the name of vesico-vaginal fistulæ, and are for the most part remedied by plastic operations effected from the vagina. Trendelenburg records* two instances where he succeeded in closing such fistulæ by opening the bladder above the pubes by a transverse incision. This enabled him to pare the edges of the fistula, and to close it with sutures, the knots of which were made to fall within the vagina. The late Mr. McGill† also recorded two similar instances. It seems likely, however, that the suprapubic operation will be limited to exceptional instances, where either the fistula was large or its position such as to render it desirable that the interior of the bladder should be seen, as, for instance, for the purpose of avoiding the orifice of a ureter. The vaginal operation is on all other grounds to be preferred, as it is safe and not usually difficult. Mention may here be made, in connection with some very extensive forms of vesico-vaginal fistula where a plastic operation is for some reason or other out of the question of Dr. N. Bozeman's ‡ vesical drainage supports (Fig. 74). The apparatus consists of a flattened pear-shaped metal pessary for insertion into the vagina, terminating in a contracted portion to which a drainage-tube is attached. The latter conducts the urine into a bag secured to the patient's thigh. The upper surface of the support is concave, and perforated with holes.

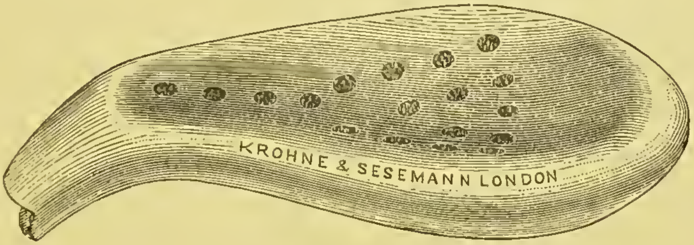

Fig. 74.

Class 5.—Sinuses leading from the bladder into the rectum through the prostate or trigone.

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* *Deutsche Med. Woch.*, June 8, 1892.

† *Transactions of the Medical Society of London*, vol. xiv.

‡ *Transactions of the International Congress*, 1887.

(*a*) Consequent on prostatic abscess.

(*b*) Following puncture of the bladder from the rectum, or other similar proceeding, or from injuries inflicted on the parts.

Sinuses occupying this position can generally be demonstrated by the speculum or rectal endoscope. I have found the latter instrument of much service in this class of cases, as I have on several occasions been enabled to see an opening which could not otherwise be inspected. In making an examination by the endoscope, the patient, having previously had his rectum emptied both by an aperient and an enema, should be placed in the lithotomy position, when it will be found possible to explore the bowel for at least six inches. After the aperient has acted it is well to steady the bowels by some astringent such as chalk and opium, as Mr. Howse suggests. The causes of these two sinuses may be divided into two classes.

(*a*) Prostatic abscesses. Matter formed in this position, either arising from tubercular deposit in the follicles or from follicular prostatitis, will sometimes burst into the rectum and establish a fistulous communication. Sinuses thus formed are difficult to heal by reason of their position; if, however, the openings are small, and the patient is not suffering from urethral stricture, but little inconvenience is occasioned. In one instance, where the rectum was much excoriated by the constant dribbling of urine, as the opening could be seen with a speculum, the fistula was touched with an actual cautery wire, and the patient made to lie on his abdomen for a fortnight. The expedient proved successful, as the gentleman shortly afterwards left for India, where I believe he remains, quite well. The following case illustrates some of the features connected with this form of fistula and the treatment which was practised with the view of closing it.

Case.—The patient was a medical man whom I saw in 1884, in consultation with the late Mr. R. N. Pughe. Twenty years previously he had suffered from prostatic abscess which opened into the rectum, causing the discharge of wind along the urethra. To remedy this, the sphincter ani had been divided on either side, but without improving matters materially. Subsequently some stricture of the urethra was detected and removed by internal urethrotomy, but without avail.

When I saw him he complained of frequent micturition, and the passage of flatus along the urethra occasionally, but always after micturition. He appeared never to expel wind simultaneously from the bladder and bowel. On introducing the finger into the rectum, a prominent elevation was felt, and beyond it a fistulous opening leading through an atrophied prostate into the bladder. A full-sized urethral as well as a rectum bougie passed easily, and I did not consider that the case warranted surgical interference. I recommended the occasional use of a bougie both for the bowel and urethra, and washing out the bladder should there be signs of lodgment of fæcal matter. The precise nature of the original prostatitis was obscure.

(*b*) Fistulæ following punctures and wounds. Cock's operation of puncturing the bladder above the prostate, and proceedings of a like nature through the prostate, have been followed by fistulous communications. In these cases it must, however, be remembered there is the complication of a urethral stricture. The first indication in treatment is to remove, where practicable, the cause of the obstruction. Instances, however, will be found where these fistulæ have proved permanent by reason of the obstructed urethra, the rectum being used as a common receptacle for urine and fæces, and it is remarkable how little inconvenience is suffered by some of those persons having these openings. As a rule, when the fistulæ occupy this position, and are small, the passage of fæcal matter into the bladder is seldom complained of; but should the opening be of such a size as to allow the contents of the rectum to pass into the bladder and distress the patient, then the propriety of colotomy would have to be considered. Some years ago I met with a patient who had been operated upon abroad. He told me that he passed all his fæces quite comfortably through a colotomy, and reserved his rectum for his urine, as his urethra was entirely obliterated by an old stricture. Unfortunately, I only saw him on one occasion, and had no opportunity of doing more than verify his statement. I have not heard of him since, but he appeared to be in excellent health.

Fistulous communications of this kind are sometimes the result of injuries accidentally received. The following instance illustrates a remarkable form of injury, and a result which was certainly better than could have been anticipated:—

Case.—In 1871, in consultation with Dr. W. H. Horrocks and Dr. C. Hill, I saw a boy, aged 14, who, in endeavouring to pass between a railway waggon and the engine, became empaled on the coupling, and was also squeezed with much force. When I examined him there was a lacerated wound of the rectum almost encircling the bowel. The membranous urethra and back of the bladder were bared, but not torn across. Ten days afterwards it was found that urine and fæces flowed from the bowel, which was in a sloughing condition. Eventually he recovered, but the whole of his urine was passed by the rectum.

I saw this patient about fifteen years afterwards, and was surprised to find, considering the extent of his injuries, how comparatively comfortable he remained. The rectum answered fairly well the double function of bladder and bowel. The membranous urethra, prostate, and a portion of the posterior wall of the bladder, were absent. The case was quite beyond the reach of any plastic operation.

In one case of vesico-rectal fistula I had to abandon an attempt to close the false route by a plastic operation conducted through a supra-pubic opening by reason of the bladder aperture not corresponding directly with the intestinal. Had I closed the bladder opening by sutures, as I think I could have done, there still would have remained a considerable pouch connected with the intestines, in which fæcal matter would have lodged. The patient was a young man who had suffered from this vesico-intestinal fistula for some years. The attempt thus made to close the sinus was followed by acute cystitis, in the course of which the entire mucous membrane was exfoliated and removed like a bag with a hole in it through the supra-pubic opening, somewhat resembling a case elsewhere described (Fig. 70). The wound healed, but the connection between the bladder and bowel still exists. As a recurrence of calculus is sure to take place, there appears to me to be no alternative but that of establishing an artificial anus by opening the bowel at a point above where it communicates with the bladder, as was adopted in the case recorded on page 338. Atrophy of the gut below the point where the artificial anus was made would be likely to lead to a closure of the false route, as happened in the instance just referred to.

Class 6.—Sinuses leading from the urethra into the rectum following lithotomy, prostatotomy, and urethrotomy. These are generally accidentally caused by the knife, though in some instances the false communication has been undoubtedly produced by the extraction of the stone, or the subsequent sloughing of the parts through an excess in inflammation. It will be well to consider these various conditions under the circumstances in which they present themselves. The possibility of wounding the rectum and establishing a fistula after perinæal lithotomy may be regarded as a remote one, as the movement of the knife is not, or ought never to be, in the direction of the bowel. It sometimes comes about in elderly persons that the bowel is forced into the perinæal wound by an expulsive movement of the patient, when it may easily be pricked in feeling about for the staff unless the knife is guarded by the finger of the operator. It once happened to me in this way, in performing a prostatotomy, but no harm followed, as the puncture was small, and would not have been noticed had not a few bubbles of air appeared in the wound. On introducing my finger into the rectum, I could easily turn its upper wall into the external perinæal incision, and in this way discovered what had occurred. If it is a mere puncture into the bowel it should be left alone; if larger, it may be closed by catgut sutures passed in from the perinæal opening. Failing these, the lesion had better be left to take its chance, with the view of remedying matters as they arise at some future date. The following illustration shows what may be done to meet the inconvenience resulting from this accident when other measures prove unavailing:—

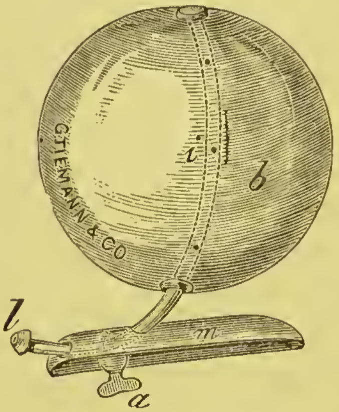

Fig. 75.[*]

Case.—A gentleman, aged 34, was referred to me by Dr. J. De Vere Hill, under the following circumstances: About 1867, when aged 16 years, he had undergone lateral lithotomy. Unfortunately, the rectum was opened, and a fistula was the result. The inconvenience, however, was limited to the escape of urine when the bladder was full, and no apparatus was then necessary. Two years previous to my seeing him, an attempt had been made to close the fistula with the cautery, but with the result of making the opening larger, and the inconvenience greater. To remedy this, an air tampon (Fig. 75) was made for him by Messrs. Tiemann, of New York, which effectually stops the leak, and permits the patient to go about his avocations, and to ride, with little inconvenience. He consulted me in reference to a small pile which came in the way of the tampon whilst being introduced, and which I removed with the clamp and cautery. The cicatricial character of the fistulous track would render any attempt to close it by a plastic operation of very doubtful utility.

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[*] Letter *l* shows where the inflating pump is attached; *a*, the stopcock below; *m* is the round spoon-shaped metal dish, narrow and elongated, and open below; *i* is the perforated tube extending to the end of the globe (inside the globe). The globe, *b*, of pure thin rubber, is now inflated. The drawing is about half size.

TWENTY-FIFTH LECTURE.

Rupture and Injuries of the Bladder.

Rupture or bursting of the bladder may be caused by violence applied directly over it when it is in a more or less distended condition; by penetration from within, as by the sharp ends of fractured bones; or, from without, by bullets and other missiles. It has been known to give way under artificial distension for surgical purposes, and it is also believed to have been ruptured by muscular contraction.* It has been occasionally opened in the course of surgical operations involving parts in its immediate contiguity.

There are certain general considerations to which reference may first be made before proceeding to consider the varieties the injury presents in view of their treatment. In many cases of rupture of the bladder there can be no doubt that a weakened condition of the viscus, due to long-standing disease, contributed in no small measure to this result. This circumstance is important to remember where we have to employ distension of the bladder for surgical purposes, as, for instance, in supra-pubic cystotomy, where the resistance of the coats of the viscus is occasionally submitted to a somewhat severe test. In relation to contributing causes of rupture of the bladder, Mr. W. H. Bennett † has reported a case where the puncture made by an aspirator needle preceded this event. In the next place stress may be laid upon the importance of making an early diagnosis in all instances of this kind, as if the rupture is to be closed with any chance of success no time should be lost. Hence, it is a good rule in cases of pelvic injury, or even suspicion that such may have occurred, to make careful investigations as to the state of the bladder, and if necessary to take the precaution of using the catheter. If a direction of this kind can be regarded as applying to conscious patients, it does so with still greater force to those who, for some reason or other, are not in possession of their faculties. In more than one instance I have known it was discovered after death that the insensibility of alcohol or poison led to a lesion of this kind having been overlooked. Though in none of the cases I can now recall to mind was the ruptured bladder the immediate cause of death, the fact that it complicated other still more serious conditions must not be forgotten. Further, as cases of this kind not unfrequently occur in connection with matters requiring medico-legal investigation, such as in fighting, sparring, wrestling, and in modern football, difficulties sometimes arise in getting at the facts, for which allowance should be made. In hospital practice it has happened that this lesion has not been recognised, because not suspected, and thus complaints have arisen in consequence of patients having been allowed to go to their homes and remain there until symptoms have developed. Subsequent autopsy, in some of the cases, has shown the difficulties connected with diagnosis to have been well-nigh insuperable.

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* Dr. McEwen, *Lancet*, Sept. 27, 1873; also see page 33.

† *Transactions of the Royal Med. and Chir. Society*, Feb. 22, 1887.

Ruptures of the bladder are of two kinds: Intra-peritonæal and extra-peritonæal. In the former the area of the abdomen, as defined by the peritonæum, is opened into, and urine usually escapes into it; whilst in the latter, if urine escapes it is in the form of an infiltration around the parts constituting what is called the neck of the bladder, where it produces effects such as are observed in more superficial parts in connection with extravasation of urine.

In the case of an injury applied over the region of the bladder, how are we to ascertain that this organ is ruptured, and if so, whether the rupture involves the cavity of the abdomen? Having determined these two points, what are the lines of treatment? These three aspects will now be considered. In addition to the history of the injury and its locality, such a lesion is usually attended with considerable collapse. If the urine has suddenly escaped into the peritonæal space, this collapse may be spoken of as profound, and peritonitis follows with much acuteness. Then we have the fact that the catheter usually draws off only a small quantity of blood-stained urine, and possibly it may at the same time be noted that the instrument passes quite easily up to the hilt, giving the impression that it must have entered the abdominal cavity, which often is the case. Upon the latter point there is, however, some variation. Though there may be a rent directly communicating with the peritonæal cavity, the end of the catheter may not happen to pass through it, and then a sensation of contraction is experienced such as almost to lead the surgeon to believe that the instrument has not taken the natural course. Examination, however, by the finger in the rectum generally serves to indicate that the instrument is in its right position, but is firmly grasped by the contracted viscus.

Case.—In a case of extra-peritonæal rupture of the bladder, which was inflicted by a man falling, whilst wrestling, and striking his prostrate opponent with his knee just above the pubes, there was the sensation of contraction experienced on introducing a metal catheter, but this was tolerably clearly due to the end of the catheter having passed through the rent in the anterior wall of the bladder immediately above the prostate, which was also involved in the injury. A *post-mortem* examination showed that the end of the catheter had passed through the rupture and had entered the porta vesicæ of Retzius. Death was caused by cellulitis, due to deep urinary extravasation. In this case had a drainage-tube been carried through the rent and out by a perinæal opening from a supra-pubic incision into the porta vesicæ, I believe the man's life might possibly have been saved, as the case really resolved itself into one of urine drainage.

If the catheter does not indicate with clearness that the cavity of the peritonæum is opened, the distension test should be tried on the principle described by Dr. R. F. Weir,* who, after stating the injuries and the symptoms of the following case, thus remarks:—

"Only two procedures seemed available therefore, viz., digital exploration by a perinæal incision,† or by opening into the abdominal cavity. Rather than resort to either of these I thought of using the test of distension of the bladder, as has been employed in the recently improved supra-pubic opening of the bladder for calculus, tumours, etc. Accordingly, two hours later, the abdominal tenderness having increased, the patient was etherised, and a rubber catheter first inserted into the bladder, and then Peterson's rubber-bag ‡ passed into the rectum and distended with seven and a half ounces of warm water. After this had been done, and after the line of supra-pubic flatness, now slightly augmented, had been outlined by a coloured pencil, seven and a half ounces of carbolic acid solution—one to one hundred—were slowly introduced into the bladder. When six ounces had been passed in, the contour of the bladder could be felt above the line of blood extravasation, and the additional quantity of fluid served only to make this more positive, especially so on the lateral aspect of the distended viscus. The injected fluid was then allowed to flow from the bladder and measured, and found to correspond with the quantity forced in. The demonstration was perfect, not only as to the impossibility of an intra-peritonæal, but also, from the non-increase in the line of dulness over the pubes, as to an extra-peritonæal laceration, and the rectal bag was thereupon also emptied and withdrawn, and the patient saved from any surgical interference of a more heroic character."

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* *New York Medical Record*, Jan. 22, 1887.

† See an article "On Rupture of the Bladder treated successfully by Perinæal and Hypogastric Incision and Drainage," *Medical Record*, New York, March 29, 1884 (quoted on page 357).

‡ The bag had been encircled by a netting of silk to prevent over-distension, as suggested by me in a recent paper on supra-pubic cystotomy, *Medical News*, Dec. 4, 1886.

The diagnosis of intra-peritonæal rupture having been made, laparotomy should be undertaken. In connection with this proceeding we are indebted to Sir William MacCormac for the first successful records of closure of the ruptured bladder by suture. Without going into the details of the two cases he has recorded, stress may be laid on some points which are evidently of importance. It does not appear to have been necessary to pare the edges of the wound in the bladder, though great pains were taken, by careful approximation of the sutures, to make the bladder water-tight, and thus to prevent leakage. Carbolised silk sutures were used, and they were introduced as shown in Fig. 76. In reference to the use of a catheter, as well as drainage of the abdomen, Sir William remarks:* "If the rent be sutured effectively, the patient runs less risk from moderate distension of the bladder, which is all that can possibly occur in a case properly watched, than he does from the consequences of retaining a catheter for some days within the viscus. The experience of my two cases goes far to prove that the catheter may in many instances be safely dispensed with altogether. I am sure, too, an abdominal drainage-tube is not in most cases needful, and that its presence proves a source of danger to the patient." Illustrations of this practice have also been recorded by Mr. Christopher Heath and Mr. Willett, but, as Mr. Holmes observed in the discussion following the narration of these cases, the fatal issue was due to the giving way of sutures, so that neither could be quoted against the probable efficiency of the operation.† Though there can be no doubt that laparotomy and suture of the ruptured bladder is the safest course to be pursued in cases of this nature, the question may be raised as to whether, under any other circumstances, repair has been known to take place. In reference to this point, the following case recorded by Mr. Henry Morris* is of interest:—

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* *Lancet*, Dec. 11, 1886.

† *Trans. Royal Med. and Chir. Society*, Feb. 25, 1879.

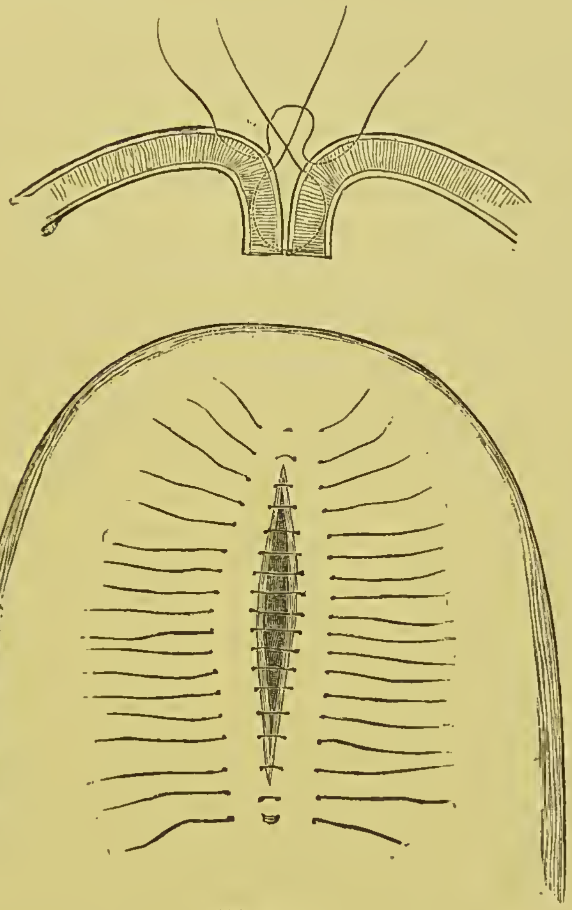

Fig. 76.

Case.—The patient was received at the Middlesex Hospital in 1879, and treated for a rupture of the bladder consequent upon violence. The treatment consisted of fomentations, opium, and the retention, "just within the neck of the bladder, of a gum-elastic catheter." He recovered perfectly. In 1886 he was again admitted into the Middlesex Hospital, and died shortly afterwards of rupture of the bladder. The parts removed were submitted to a committee, who reported "the specimen exhibits all the features which might be expected at a remote period after rupture of the bladder." Mr. Morris remarks: "This case was reported in 1879 as one of recovery from rupture of the bladder. It is now brought before the Society because in its completed form it affords conclusive proof that an intra-peritonæal rupture of the bladder is not necessarily fatal, but may be recovered from under the simple treatment employed in this case, provided the urine at the time of the rupture is of normal composition."

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* *Trans. Royal Med. and Chir. Society*, Feb. 22, 1887.

Such an inference as Mr. Morris's case suggests is warrantable from other circumstances observed in connection with certain appearances presented after death in some instances of intra-peritonæal rupture of the bladder, in conjunction with clinical experience relative to the drainage of urine from within the area of the pelvis. So great is the contraction of the bladder after it has been ruptured and its contents expelled into the peritonæal cavity, as noted particularly by Mr. Rivington * in his excellent treatise on this subject, as to render it highly probable that if a free and involuntary exit for the urine were provided within a reasonable period after the receipt of this injury, Nature would be able to effect the rest and bring about recovery without the adoption of other means. So far as my experience goes in connection with the various ways of opening the bladder, in all of which I may say I have had some experience, the only one that can be trusted for such a purpose is the incision made for lateral lithotomy, as combining in the one method free, involuntary, and dependent escape for the urine as it emerges from the ureters. On several occasions I have had to put my finger into the bladder, through the wound, within a few days after a lateral lithotomy has been performed, and I have been struck with the

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* *Rupture of the Urinary Bladder.* Churchill, 1884.

firm contraction of the viscus with which this procedure was invariably met. The following case * seems to support this, and shows, where circumstances were propitious, how nearly the imperfect drainage afforded by catheterism was successful :—

Case.—At the time of the accident, which was caused by the patient's adversary falling upon him during a pugilistic encounter, a sensation of something having given way was experienced. He walked home, a distance of two miles, when he was seen by Mr. Robinson, his medical attendant, who drew off twenty ounces of bloody urine, and continued to do so twice a day for three days, until he was admitted into the Leicester Infirmary under the care of Mr. Crossley. On his admission, Nov. 20, 1872, he presented the following signs: He was able to walk without assistance; countenance rather anxious; pulse 80, full; skin cold; complained of a sensation of weight in the hypogastric region, but no tenderness on pressure. On percussion over the abdomen an increased area of dulness was detected, and on palpation a distinct sensation of fluctuation. A silver catheter was introduced, and thirty ounces of clear urine drawn off, the abdominal dulness and fluctuation entirely disappearing. A gum-elastic catheter was subsequently passed night and morning. The patient continued much in the same state up to the evening of December 1st, when, without any premonitory symptoms, he was seized with a severe attack of convulsions, rapidly followed by coma. Every effort was made to rouse him; a catheter was immediately introduced, and about twenty ounces of urine drawn off, consciousness returning in about an hour. On the following day he was again attacked in a similar way, and on December 3rd he was seized with a more violent form of convulsions, and sank in three hours in a comatose state.

Post-mortem examination.—Slight bruise over the scrotum. On opening the peritonæal cavity, about four pints of clear fluid welled up through the incision. The bladder was found contracted, and a laceration of its posterior surface to the length of two inches was detected extending in an oblique direction. In other respects the organs presented no morbid changes.

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* *Medical Times and Gazette*, Sept. 28, 1872.

Remarks.—This case presents the following points of interest: First, the power of locomotion after so serious an accident, the patient having walked to his home, a distance of two miles, immediately after the occurrence. Secondly, the length of time he survived—sixteen clear days—the average duration of life in these cases being from three to seven days. Thirdly, the absence of all signs of peritonitis. Fourthly, could the death of the patient be attributed to peritonæal absorption?

In view, however, of what has been effected by laparotomy and suture, no other treatment could be recommended, unless for some reason or other it was found impossible to give effect to it.

The diagnosis of extra-peritonæal rupture of the bladder is somewhat facilitated by excluding, in the way referred to, the likelihood of the other variety. If the use of the catheter, in conjunction with the history of the case, and examination by the rectum are insufficient to indicate this, in the presence of a lesion evidently involving the mechanism of micturition, a perinæal puncture into the membranous urethra for the digital exploration of the neck of the bladder should be proceeded with. Many patients in cases of this kind have undoubtedly been lost for the want of that knowledge which can only thus be obtained. Where the suspicion is grave, the possibility of not finding such a lesion by exploring should not be allowed to weigh against making the attempt. If a pelvic fracture, with rupture of the bladder, or rupture alone, is discovered, a drainage-tube should be inserted in the bladder. If the prevesical space is also opened, an additional aperture above the pubes will be required, in order that through drainage may be provided. Procedures of this kind are safe and slight compared with the risk connected with extravasation of urine imperceptibly going on in a part where otherwise drainage is impossible and subsequent absorption certain. This point is illustrated in the following case I saw, in consultation with Dr. C. G. Walker, at the Bootle Hospital in 1882:—

Case.—The patient, aged 40, a fireman on board a steamer, was brought into hospital with the history that on the preceding day the surgeon of the ship was summoned to him in consequence of inability to pass urine and pain above the pubes. It was thought that he had been drinking, and might have hurt himself when stoking coals. The catheter was passed, and about two pints of blood-stained urine drawn off. On admission the abdomen was distended, with an area of dulness on percussion and tenderness above the pubes; the perinæum was ecchymosed, and he was collapsed. After the diagnosis of rupture of the bladder had been made, the treatment consisted in the retention of a rubber catheter and irrigation of the bladder with weak carbolic lotion. An erythematous rash, suggestive of extravasation, began to appear over the right iliac region, extending half-way down the thigh. Vomiting and prostration set in, and the patient died on the fourth day after the presumed injury. At the autopsy a cavity about the size of an orange filled with blood-clots was found behind the pubes. There was a rupture two inches in length in the anterior wall of the bladder where it is uncovered by peritonæum, the urethra being normal. Though there was no history of injury, Mr. Paul, who made the *post-mortem* examination, felt no doubt that the lesion was due to a blow above the pubes over a full bladder.

In connection with these remarks the following case, recorded by Dr. Weir,* endorses the practice that is to be recommended:—

Case.—"It was one of injury to the pelvis and left hip of a man, aged 28, by a fall of earth. A catheter was passed, on his admission to the New York Hospital on November 20, 1883, a short time after the accident, which gave exit to a moderate amount of bloody urine. The injury was regarded as a slight urethral laceration, but the marked increase in the supra-pubic dulness, which now extended four inches above the pubes and across into each groin, with tenderness, led to a closer examination of the patient. The catheter passed readily into the bladder and only occasionally gave exit to blood-stained urine. The urine itself was passed at times voluntarily, and was not apparently diminished in amount. The temperature was but 99°. Abdomen not distended, though its walls above the dulness somewhat rigid. Condition still good. No signs of fracture elicited, but the finger in the rectum detected a softer spot on the left side of the prostate, which was decidedly painful. The ecchymosis of the scrotum and perinæum was now very pronounced.

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* *New York Medical Record*, March 29, 1884.

"November 24th.—The temperature had risen to above 100°, pulse 104, and patient began to be restless and disposed to vomit. Tympanites increasing, with abdominal tenderness not only above line of dulness but below it. A large hypodermic needle inserted in the hypogastrium drew out some bloody fluid with an acid reaction and urinous odour. Nothing distinctive could be felt in the rectum. The patient was etherised and an incision, under sublimate irrigation, 1 to 1,000, was made, three and one-half inches long in median line, midway between symphysis and umbilicus, until the subperitonæal cellular plane was reached, where a large cavity, containing at least a pint of bloody, undecomposed urine, was found. The finger could be carried its full length behind the symphysis, but nothing was detected. To effect a more complete diagnosis, as well as to allow of the carrying, if possible, of a drainage-tube from the hypogastric opening down and out of the perinæum, the patient was placed in the lithotomy position, and, on a staff introduced into the bladder, a median incision was made, opening the urethra just anterior to the prostate. The finger passed in here toward the bladder revealed a rent running along the left side of the roof of the prostate which was lost in the wall of the bladder itself. Through the supra-pubic incision a large silver catheter was carried, and, aided by the finger in the perinæal wound, was caused to pass through the laceration of the bladder and emerge from the lower wound. To the eye of this catheter a thread was attached, and a large rubber drainage-tube pulled through as the silver instrument was withdrawn. Each end of the tube was secured by a suture to the skin, and a second drainage-tube was then passed into the bladder, and its external end also fastened in the perinæum. The cavity of the extravasation and the bladder were carefully washed out with a warm sublimate solution of 1 to 2,000, and iodoform gauze placed over each wound, though so lightly that urine could readily flow through the dressing. The progress of the case was in every way most satisfactory, the patient making a complete recovery, and leaving the hospital on December 24th."

Penetration of the bladder by sharp instruments, or by bullets and other projectiles, is occasionally met with in civil as well as in military practice. An unusual case of this kind is recorded by Mr. Treves, from the practice of Mr. Couper.*

Case.—A seaman, aged 23, was admitted into the London Hospital on April 26, with a small incised wound of the left buttock. He had been stabbed, in a quarrel, with a sailor's long knife. He walked into the receiving room, but with difficulty; was blanched, and in a condition approaching collapse. From the condition of his trousers it was evident that he had lost a great deal of blood. The wound was about one inch long, was clean cut, and situated exactly in the middle of the left buttock. The finger introduced into the wound passed for some depth in the direction of the great sciatic notch, and that notch, indeed, could be felt. There was a little venous oozing from the wound, which was immediately checked by pressure. The wound was treated antiseptically. The patient complained of no pain other than that immediately about the wound. Shortly after admission he passed his water; it was clear, and contained no blood. Next day, patient appeared quite comfortable, made no complaint, had no difficulty with his water, which was passed at usual intervals and was always normal. April 28.—Patient vomited several times; complained of pain over abdomen; became restless. Temperature at night 104°. Symptoms of acute peritonitis now became more apparent, and death took place on May 1. Throughout the whole case the patient never had any trouble with his bladder.

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* *Medical Times and Gazette*, June 14, 1879.

At the *post-mortem* examination the knife was found to have taken the following course: It had penetrated the gluteal muscles, divided a part of the great sacro-sciatic ligament, and passed through the small sacro-sciatic notch, completely dividing the pudic artery and nerve and one vein. Each end of the pudic artery was perfectly closed by a little clot. The knife had then entered the bladder at its lower part, and close to the trigone, making a wound large enough to admit the tip of the forefinger. There was diffuse suppuration of the cellular tissue of the pelvis, and general acute peritonitis.

The case is interesting as illustrating the complication which, from the symptoms, there were no grounds for suspecting, *post-mortem* examination alone revealing it. In cases of incised wounds, where there is a suspicion or evidence that the bladder is wounded, it is probably better to allow the urine to drain off by a catheter, passed either through the wound or along the urethra, whichever way the urine flows the more freely, rather than to permit of it being voluntarily discharged by the bladder. In wounds of the anterior wall of the bladder the experience of supra-pubic incisions made for surgical purposes, and suicidally, seems to indicate that the best plan is to leave the wound to granulate, provided the urethra is not strictured. In the latter case, perinæal puncture for drainage, with division of the contraction, might be required.

Sir William Stokes* records the particulars of a remarkable case where one of the long handles of a pair of iron tongs, over which a boy was vaulting, entered the rectum and passed through the bladder into the peritonæal cavity. The viscus was consequently ruptured in two places. Death followed in seventy-four hours from peritonitis.

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* "On Penetrating Wounds of the Bladder," *Trans. Academy of Medicine, Ireland,* 1883.

Gunshot wounds involving the bladder, though requiring treatment on general principles, belong to a branch of surgery of which, as civilians, we see but little. Every variety of this kind will be found illustrated in a work which modern warfare* has provided us with. A foreign body which has found its way directly into the bladder, or indirectly by ulceration or sloughing, may serve as a nucleus for the formation of stone; of this we have instances, in the work referred to, of concretions forming on arrow-heads, as used by the Indians, on bullets and other projectiles, on pieces of bone, or on the *débris* of a fractured pelvis which have made their way into the bladder. Portions of clothing, buttons, and other articles of dress, have also become covered with phosphatic concretions. In all cases of gunshot injuries involving the urinary apparatus care should be taken, either by catheterism or incision, to provide for escape of the urine, as its collection in the locality of extravasated blood or damaged tissue is a certain cause of destructive inflammation.

It is asserted that rupture of the bladder may occur without extravasation of urine ensuing as a consequence. I do not see what positive evidence of this can be afforded; the nature of the injury and hæmaturia may possibly suggest it, but this is about all that can be said. If I were to suspect that a slight rupture had taken place, which by some means or other—such, for instance, as the presence of a clot in the wound, its valvular form, or the exudation of inflammatory material—had become occluded, I should not feel disposed either to pass a catheter, provided there was no retention, or to retain one. I would sooner trust to Nature completing a task she had commenced so well, aiding her, perhaps, in keeping the parts quiet and the skin active by the internal administration of opium.

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* *Medical and Surgical History of the War of the Rebellion, U.S.A.*

The power of the patient to voluntarily expel his urine is occasionally temporarily suspended in connection with other injuries to the trunk. Retention of urine not unfrequently follows concussion of the spine. Power usually returns in the course of forty-eight hours, and, so far as this symptom is concerned, nothing further than regular catheterism is required. In courts of law imperfect power in micturition is sometimes referred to as a symptom of spinal concussion. When it immediately follows an injury and disappears, it need not create apprehension, as it is only in keeping with the other signs of nerve shock. If it occurs after a lapse of time, and is consequent upon an injury, its import is grave, as it is probably connected with structural changes in the nerve centre controlling the action of the bladder. Retention of urine happens in connection with violent contusions, such as crushes involving the abdominal muscles. The inability of the latter to co-operate with the bladder in the expulsion of urine, without causing pain, is sufficient to explain this, and does not require any special treatment beyond the use of the catheter until normal function returns.

TWENTY-SIXTH LECTURE.

SOME POINTS CONNECTED WITH THE SURGERY OF THE KIDNEY AND URETER.

THE surgery of the kidney has recently made such rapid strides that it would not be possible to include within the scope of these lectures any systematic description of those disorders which come within its province, or where the surgeon has to supplement the work of the physician. I shall, therefore, not attempt to do more than offer a few remarks on certain points which have interested me in connection with this subject.

Reference has been incidentally made, in noticing the symptoms of hæmaturia, and elsewhere, to the treatment of renal colic, arising from the passage of stones through the kidneys and down the ureters. During the violence of the attack, dry heat, in the form of rubber bottles, filled with hot water, and hypodermic injections of morphia, will usually be required. When the attack is over, patients should, as a rule, be instructed to flush their urinary apparatus with some suitable diluent. For this purpose I employ, amongst other means, the boro-citrate of magnesia, taken in the proportion of one teaspoonful of the powder in a tumbler of warm water once or twice a day on an empty stomach. My attention was first called to this preparation by a paper by Dr. Kochler, of Kosten,* who advocated its use in cases of uric acid calculi and gravel. From what I have seen expelled after it has been prescribed I am disposed to think that it not only induces a person suffering from renal calculi to take a considerable amount of fluid, but that it is capable of modifying or altering some of the conditions upon which the formation and cohesion of urate stones depend.

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* *Berlin Klin. Wochenschrift*, Nov. 3, 1879.

Digital exploration of the kidney from the loin is an operation which I believe might more frequently be adopted with advantage in chronic cases where other treatment has proved of no avail. A stone may be so locked in a kidney as to give but slight evidence of its presence, yet all the time it may be growing and causing structural deterioration of the organ in which it is situated. Here is a specimen of the kind now referred to (Fig. 77), where the usual symptoms of stone in the kidney were absent. I was induced to explore at the patient's request in consequence of a fixed sensation, hardly amounting to pain, which was aggravated by pressure on one spot in the lumbar region. I exposed the kidney, detected and removed the stone, and the patient was well in three weeks. The shape of the stone probably explained the slightness of the symptoms. In several cases that I have explored for pain, but where no stone was found, complete recovery followed. I am disposed to think that in some instances tension has been relieved by the opening of the capsule of the kidney, for the purposes of puncture or further exploration, as sometimes happens in the case of the testis when inflamed. I have never seen any harm arise from lumbar examination of the kidney, and I can hardly recall an instance where permanent benefit did not follow.

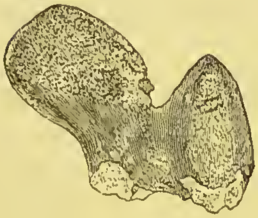

Fig. 77.

It is remarkable how little it takes sometimes to induce a calculus to move downwards, and where a ureter is more or less permanently dilated, as in the case of persons who frequently pass calculi, the explanation is obvious. Reference has been made by me to the fact* that the injection of water into the bladder has occasionally proved of assistance in favouring the release of a calculus down the ureter. This process has also been found of service in expediting the discharge of tuberculous *débris* from the kidney. It would probably also be useful in those exceptional cases, such as the one recorded by Dr. Rattray and Mr. Greig Smith,† where sloughs of renal tissue made their escape by the urethra. Again, it is of advantage in suppurative pyelitis, by assisting the escape of the matter downwards. It has been noted that after its adoption high temperatures from the retention of pus have ceased.

Instances frequently come under observation of persons suffering from an undue mobility of the kidney, caused by violent concussions to which the body has been subjected. Hence the importance of rest and support in all cases where injuries of this kind have been sustained. I once had a gentleman under observation who suffered much inconvenience from a movable kidney, which was not complained of before he had a severe fall from his horse. Mr. Bruce Clarke ‡ has drawn attention to the resemblance between what he describes as acute renal dislocation and the paroxysms of renal colic.

Rupture or laceration of the kidney is usually caused by falls or blows, where the violence is applied directly over the organ. In the following case, though there were no means of verifying by inspection the nature of the internal damage, no doubt could be entertained as to what had occurred:—

Case.—A dock labourer, aged 42, was in the summer of 1865 admitted into the Liverpool Northern Hospital under my care for an injury to his back, caused by falling down the hold of a steamship on to the edge of a case of goods. The patient was much collapsed, and there was a contusion in the right lumbar region, without any breach of surface. On partially recovering from his collapse, in the course of a few hours, he passed urine deeply discoloured by blood and small clots. On the day following the injury the urine contained some long worm-like clots which had been moulded within the ureter. These were not present after the third day. In addition, by the microscope, blood-casts of the uriniferous tubes were occasionally seen. The patient's condition gradually improved, though the urine showed traces of blood for nearly three weeks.

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* *Lancet*, March 10, 1888.

† *British Medical Journal*, Jan. 31, 1891.

‡ *Medico-Chirurgical Transactions*, 1893.

In injuries involving a lesion of an internal organ we recognise in the collapse which follows a provision for favouring the process of clotting by which the vessels are sealed and excretion is suspended. The latter is important, for if the laceration were sufficient to permit of urine escaping into the tissues about the kidney, damage would be done, such as is seen when this secretion is elsewhere extravasated. For some time afterwards the injured kidney must be little else than a percolator of water, minus the urinary salts, the excretion of the latter being provided for by a compensating action on the part of the opposite organ. It is to the immediate plugging of the renal blood-vessels, coupled with the fact that, if time is allowed, the uninjured organ is capable of doing double duty, that so many recoveries take place after rupture of the kidney. Hence we prefer to meet the collapse attending this injury by warmth, in the shape of hot blankets and sinapisms, which by determining blood to the skin favours repair. The bleeding from a lacerated kidney usually subsides spontaneously, but when considerable its arrest may be aided by gallic acid, matico, or ergot.

Dr. H. G. Rawdon reports a case* I had the advantage of seeing with him, which, in connection with the treatment of extensive ruptures of the kidney, was, at the time of its occurrence, unique.

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* *Liverpool Med.-Chir. Journal*, January, 1884.

Case.—Here, on a boy aged 12, nephrectomy was performed for rupture caused by a fall. The operation was undertaken for persistent hæmorrhage and cystitis, the latter being due to retained and decomposing blood-clots. It was hoped that by removing the lacerated kidney both the hæmorrhage and cystitis would cease. The kidney was cut down upon by lumbar incision, and found almost torn across. The two portions were enucleated, ligatured, and removed by scissors. Though the hæmorrhage ceased after this, the cystitis continued, and gave rise to frequent attacks of pain and retention of urine. Lateral cystotomy was accordingly performed, which permitted the removal of a decomposing blood-clot. The patient died on the forty-first day. Nephrectomy was performed on the seventeenth day, and cystotomy on the twenty-first day after the injury to the kidney. At the *post-mortem* examination the opposite kidney was found enlarged, and on section showed numerous points of suppuration. Both the pelvis of the kidney and corresponding ureter were considerably dilated and filled with pus. The condition of the remaining kidney undoubtedly caused the death of the patient. It was also equally clear that the state of the bladder was alone responsible for the suppurative pyelitis which had ensued and caused death.

Though I have never met with an instance of acute urine poisoning following accidental laceration or wound of the kidney, there can be no doubt it has happened, as illustrated in the following case recorded by Mr. Dobson*:—

Case.—"The case was that of a married woman, aged 35, who had for some time in the country been treated for painful bladder troubles; she was admitted into the hospital, when a swelling was discovered in the left loin. There was no doubt that the swelling was connected with the kidney and probably due to pus. I incised the kidney substance under chloroform, with antiseptic precautions, let out the pus which was in the pelvis of the kidney, and, after examining the interior of the pelvis with my finger, inserted a drainage-tube. The operation took place at 1.30 p.m., and occupied only a few minutes; at 4.30 she was taken with a violent rigor, and at 5 o'clock her temperature was 106·4. A dose of 15 grains of quinine was administered, and her temperature fell to 105° at 6.30; 104° at 7.30; 103° at 8.30; rose to 104° at 10.30, and fell again to 103·2° at 12 p.m. When seen last by the house-surgeon at midnight he thought her fairly comfortable, but she died at 5 a.m., about sixteen hours after the operation. There was neither loss of blood nor shock. The external wound, which was small, was dressed antiseptically. The case, I think, is important, because in these early days of kidney surgery it is not clearly established whether it is better to incise the kidney structure or open the pelvis directly; and also because I could refer death only to that condition which occasionally manifests itself with rapidly fatal results after operations on the male urethra, and which we term urethral fever, in which a patient may die within twelve hours of an operation on the urethra, or it may be the mere passing of a catheter, and in which nothing is to be discovered *post mortem*. But, so far as I know, nothing has yet been said, nor has any case been reported, in which similar symptoms have followed operations on the kidney itself. I do not consider death was due to shock in the ordinary sense of the word, for there was no decided shock at the operation."

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* *Medical Times*, Oct. 31, 1885.

Rupture of the ureter, or its division by an incised wound, is an accident of somewhat rare occurrence. It usually happens in connection with violent contusions involving the loin. In one instance I saw, where it was complicated with fracture of the lower ribs, I have no doubt it was caused by the man, whilst in a state of intoxication, being squeezed between a heavy waggon and a large stone. The patient died the day following his admission to the Liverpool Northern Hospital. Some blood-stained urine was removed by the catheter, but beyond this, and the general nature of the injury, there was nothing to indicate that the left ureter had been torn across immediately below the kidney, as shown by the autopsy. The late Mr. Stanley* recorded two instances of this injury: one where the diagnosis was verified by an examination after death, which took place ten weeks after the injury, and the other where, though the symptoms pointed to the probability of the lesion being present, the patient recovered. In both of these cases a prominent feature was the collection in the cellular tissue behind the peritonæum of fluid resembling urine, which had to be removed by tapping. Mr. Poland† has also recorded another instance where, consequent on a crush between a railway platform and a moving train, a ureter was ruptured, the patient surviving, with other serious injuries, for 135 hours. I refer more particularly to this case as its narration is followed by a communication from the late Dr. Moxon, which is mainly based on the condition of the kidneys as observed in Mr. Poland's case. These organs were found blocked by ante-mortem clots, and showed other indications of the violence to which they had been exposed. This occlusion of the renal vessels is, I have no doubt, a provision for the suspension of excretion and the prevention of the damage which must necessarily ensue if normal urine were extravasated through a torn kidney or a ruptured ureter. The effects are in some respects analogous to what was observed in a case recorded on page 133, where extravasated urine failed to arouse active inflammatory mischief for the reason, I believe, that owing to chronic renal mischief the excretion did not contain those salts, such as urea, in sufficient quantity to produce ammoniacal decomposition. Mr. Timothy Holmes,‡ in recording a case where a stab wound in the back probably opened a ureter, refers to the discharge from the wound of immense quantities of clear fluid. In reference to this point he remarks that "if it could be shown that a wound of the ureter or a lesion of that organ could suspend the true secreting function of the corresponding kidney, while it left its percolating function intact, or even if any theoretical explanation of such a result could be given, the case would be quite clear, since the opposite kidney would have double secretive work to do, and the urine passed by the urethra would be scanty, with excess of lithates." The following case, recorded by Mr. W. J. Collins in a paper on traumatic hydro-nephrosis,* is of much interest in connection with the diagnosis and treatment of these injuries :—

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* *Medico-Chirurgical Transactions*, vol. xxvii.

† *Guy's Hospital Reports*, 1869.

‡ *Medico-Chirurgical Transactions*, vol. lx.

Case.—G. W., aged 5, was admitted into the London Temperance Hospital on November 5th, 1889, in a collapsed state, having been run over by a cart, the wheel passing over the abdomen and pelvis. There was fracture of the left lower ribs and of the right os innominatum near the eminentia ilio-pectinea. The collapse suggested visceral lesion : the catheter drew off only a drachm or two of sanious urine. However, injection of the bladder with two ounces of boracic acid solution, and the subsequent recovery of the same quantity by bimanual expression, proved that this viscus was unruptured. For some days the urine was blood-stained, but he made a good recovery and was discharged on November 30th, passing about 23 ounces of urine per diem. A week later he was readmitted on account of a painless swelling discovered in the right loin, extending above to the hypochondrium, below to Poupart's ligament, and inwards to the navel. The colon was easily felt in front of the tumour; there was fluctuation. On deep palpation in the right inguinal region, a hard, sessile mass was felt at or near the pelvic brim, which was presumed to be callus at the site of the pelvic fracture. There was neither pain nor fever, and the general condition was good. The urine was normal, but was reduced to less than half a pint per diem, sometimes only six ounces.

December 10th, 1889.—I aspirated the tumour from the loin, withdrawing 18 ounces of pale amber-coloured fluid, of specific gravity 1003, faintly alkaline, containing a trace of albumen and 1 per cent. of urea.

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* *British Medical Journal*, April 30, 1892.

The swelling rapidly returned, and on December 16th, 20th, and 30th I again aspirated, withdrawing 25, 29, and 30 ounces respectively. Since this date I aspirated at increasing intervals down to May 21st, 1891, the patient coming up for this purpose as reaccumulation occurred. There were sixteen aspirations in all. Since May, 1891, there has been no appreciable return of the swelling, and the boy is in excellent health.

The more remote effects of these injuries relative to the formation of a stricture of the ureter and hydro-nephrosis are exemplified in the following record by Dr. Pye-Smith * :—

Case.—"The patient was 24 years of age. About two years previously to his coming into Guy's Hospital he had been kicked by a horse on the left side 'under the short ribs.' This was followed by hæmaturia. On his admission to the hospital there was a large tumour occupying the left half of the abdomen, the physical characters of which pointed to its connection with the kidney. The tumour was tapped, and a large quantity of fluid removed. After death the left kidney was found to be in a condition of cystic degeneration. The ureter was dilated for an inch and a half, when it suddenly became contracted, so as not to admit the smallest probe. A few lines nearer to the bladder it again assumed its normal size."

In 1883 I was consulted by a gentleman from South America about an injury he had received in the right loin from a bullock at a cattle ranch. The injury was not attended with an external wound, but a severe contusion of the part; it was followed by hæmaturia, and more remotely by right hydro-nephrosis, for which aspiration had been repeatedly employed. The point raised was—if the ureter is merely strictured, and not completely ruptured, can anything be done to save the kidney from atrophy? As it seemed

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* *Trans. Pathological Society*, vol. xxiii.

probable the ureter had been divided, and the corresponding kidney was rapidly becoming atrophied, I came to the conclusion it was advisable that nothing should be done, and I have since heard the patient has completely recovered his health, though there can be no doubt he has lost a kidney.

It is probable, from some experiments that have recently been made by Van Hook,* that a ruptured ureter may be united by suture combined with the invagination of the divided ends. Though only tested in dogs, who are also liable to injuries of this kind, this treatment is considered more readily applicable to man, since in the human subject the ureter is larger and more accessible.

The question has been raised in a paper by Mr. W. G. Nash,† based on a preparation of strictured ureter in the Museum of St. Bartholomew's Hospital (No. 2361 A), as to whether such a contraction can be caused by the extension of a gonorrhœal inflammation to these tubes. If it were so, I think we should meet with instances of this kind more frequently, and that consequently hydro-nephrosis and pyonephrosis would oftener require surgical relief. Still, having regard to the distance that this specific inflammation sometimes travels, as for instance in the female, I should not like entirely to put aside its possibility under the circumstances referred to.

Notwithstanding that operations on the vesical openings of the ureters, either for catheterising these tubes in the male or for draining them directly, would no doubt be now done through the medium of a supra-pubic opening, the following observations, which I made some years ago on the dead subject, with the assistance of Dr. Barron, may still find a place in this lecture.

Lateral lithotomy was performed on a middle-aged healthy subject: the incision into the bladder was extended in front by opening into the membranous urethra with a probe-pointed bistoury, and behind by cautiously extending the cut into the prostate to almost its extreme boundary. On subsequently removing the parts, it was found that in this way a considerable opening could be made into the bladder without exceeding what I should regard as a safe limit. Though the opening just described permitted a free access to the bladder for the finger, yet no part of its mucous lining could be inspected even with the employment of retractors. With the latter, aided by forcible pressure downwards, with the hand over the pubes, a small portion of the fundus of the bladder could be brought within sight, but the orifices of the ureters could not be seen, nor could any instrument, such as a probe introduced into the bladder through the wound, be made to enter them. The cavity of the abdomen was then opened by a median incision above the pubes sufficient to permit of the introduction of three fingers over the fundus of the bladder. By thus pressing the bladder down towards the perinæal wound, the whole of its mucous surface could be brought into view, including the orifices of the ureters and the trigone. In one subject, by reason of some enlargement of the prostate, the view of the latter was imperfect. With the object of improving this, the following expedients were resorted to: (1) endeavouring to elevate the part by two fingers introduced up the rectum; (2) by the introduction of a lever up the bowel; and (3) by the whole hand passed into the rectum. By the first two methods the view of the trigone was not improved, whilst the hand in the bowel, by occupying the whole space, obscured everything. When, however, there was no enlargement of the prostate, it was found possible, with the hand introduced into the abdomen, to bring all parts of the mucous surface of the bladder into sight, including that immediately behind the pubes. It was found easy to catheterise the left ureter, but the right required a little more looking for. By a bilateral section of the prostate the search for the latter was facilitated, but the conclusion we came to was that with a natural prostate this additional incision was not necessary. It seemed not only possible to bring the whole of the mucous membrane of the bladder into view and within reach of manipulation, and to catheterise the ureters, but, further, with the hand in the abdomen to command all hæmorrhage from the parts through which the deeper incision would probably pass. In a case I saw operated on by Mr. Rushton Parker, where the prostate was incised more freely than is usual, a circumstance which probably arose from the form of the calculus, almost the whole of the mucous membrane of the bladder could be readily seen, including the orifices of the ureters, which might have easily been catheterised. The patient was a boy, aged about 12 years, who made a good recovery.

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* *British Medical Journal* (Epitome), April 8, 1893.

† *Ibid.*, May 7, 1892.

In the female, the operation of catheterising the ureters is thus referred to in a case published by Mr. H. E. Clark:*—"To settle our doubts as to the soundness of the right kidney we again catheterised the ureters. This was done by Dr. Macintyre and myself by means of Pawlik's catheter. The operation is in the female a very simple one, two ridges felt on the anterior wall of the vagina serving as useful and reliable guides, which lead the catheter directly to the ureteral orifices. The small quantity of urine removed from the right ureter was in every respect normal, that from the left contained pus, epithelial *débris*, and a trace of albumen."

Some rare cases of hernia of the kidney through a wound in the abdominal walls are recorded; of this accident I have not seen an example. I quote the following from Pilcher,† with its references:—

Case.—"June 3, 1873—S. P., aged 25, was stabbed with a knife in the left hypochondrium; two or three hours after a cough set in, which caused the kidney to protrude through the wound. At the end of twenty-four hours he presented himself at the clinic of Professor Brandt, in Klausenberg, having a pulse of 80, a temperature nearly normal, and being able to walk to a gallery to be photographed. On the fourth day after being wounded the kidney was drawn out and severed, after its pedicle had been ligatured. Rapid recovery resulted. At no time did he show symptoms of uræmia or peritonitis. The quantity of urine secreted increased daily while he was under observation. June 23rd he left the hospital, able to work as before."*

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* *Glasgow Medical Journal*, May, 1887.

† *Surgical Operations upon the Kidneys*, by Dr. L. S. Pilcher, U.S.A.

Amongst the more remarkable instances of calculus impacted in the urethra is one that I had an opportunity of seeing through the kindness of Dr. Rawdon. It was the case of a patient upon whom he had performed lithotomy where the pressure of a calculus in the ureter was subsequently diagnosed in a manner that I had not previously noted, namely, by the finger in the rectum. The appearance of the specimen is shown in the drawing (Fig. 78). The following are the notes of the case :—

CASE.—T. F., a male, aged 6, was admitted into the Liverpool Infirmary for Children on September 20th, 1878, suffering from stone in the bladder. Lateral lithotomy was performed, and portions of broken-down calcareous deposit of a phosphatic nature were removed by the scoop, and the bladder cleared. After the ninth day the wound and general condition improved, and convalescence appeared to be advancing. On the twentieth day no urine was passed for six hours, and on the twenty-seventh day he complained of pain low down on the left side, which was followed by a rigor. Under chloroform the bladder was explored, but nothing was discovered to account for these symptoms. The rectum was then examined by the finger, when a solid body was felt, which was diagnosed to be a calculus in the left ureter. He sank on the thirty-second day after lithotomy.

Autopsy.—The right kidney was healthy but hypertrophied, being a third over the normal size. The ureter was natural. The left kidney was atrophied, being one-third under normal, and the pelvis and calyces were considerably dilated. The left ureter was largely dilated and impacted with friable cretaceous matter, in which two calculi were imbedded. The larger, which was felt from the rectum during life, resembled a date-stone, and was close behind the orifice of the ureter.

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* *Weiner Med. Wochenschrift*, 1873.

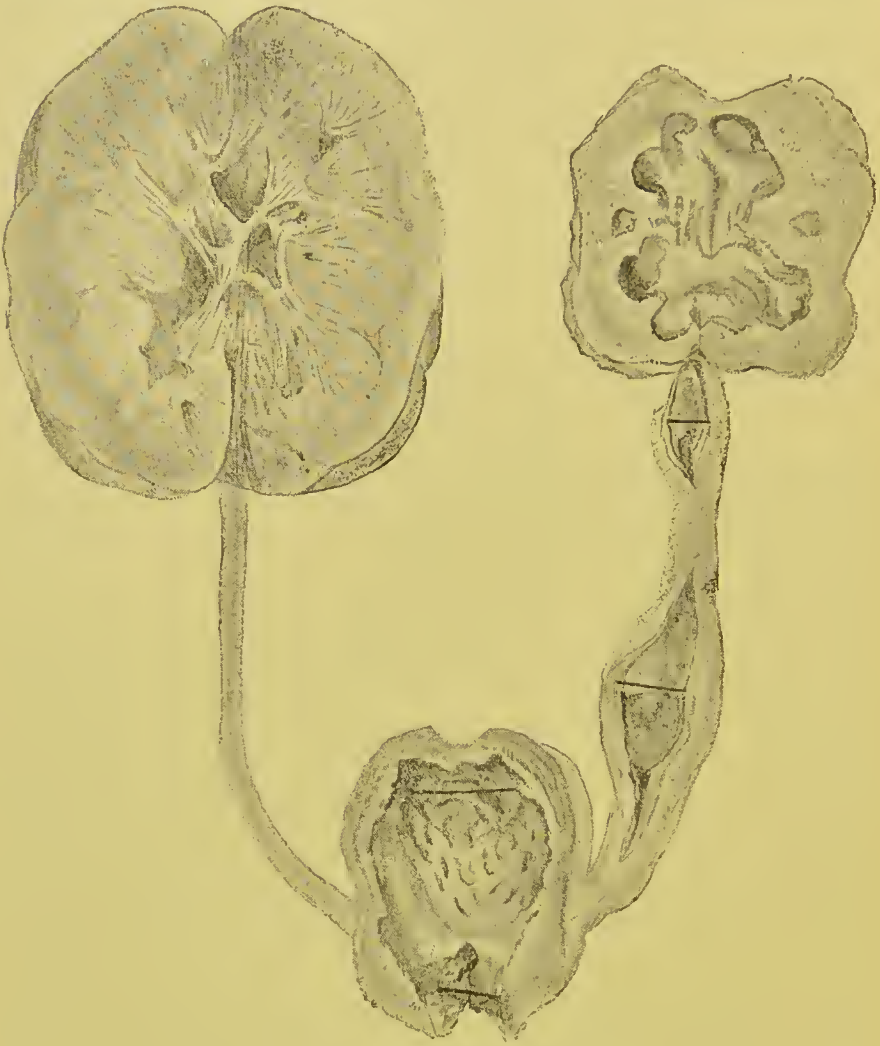

Fig. 78.

There is a case recorded by Dr. D. Newman,[*] where death followed suppression of urine which had existed for five days. At a *post-mortem* examination, symmetrical blocking of both ureters with calculi was found. Mr. Godlee* records a case where large calculi were removed from both kidneys in successive operations, and Mr. Lucas* cites an instance where nephro-lithotomy (following nephrectomy) for total suppression of urine was permanently successful.

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[*] *Surgical Cases.* Lewis.

Mr. Henry Morris† has drawn attention to the feasibility of removing calculi impacted in the lower end of the ureter by perinæal urethrotomy in the male, or by dilatation of the urethra in the female, and relates a case where such a proceeding would probably have been successful. After the bladder has been reached with the finger and explored Mr. Morris suggests the use of a scoop, which he describes: "I speak from a strong conviction when I say that I feel certain had I had such an instrument at hand I could easily have removed the calculus from the ureter of the patient whose case I have described." In these remarks another reason is adduced for exploration of the bladder in doubtful cases of continued vesical irritability. By the use of the sound I have dislodged calculi which it is believed were retained in the orifice of the ureters. The above (Fig. 79) is a specimen which was spontaneously discharged after I had examined the bladder with a sound. There is a little groove on the side of the stone which prevented the ureter being completely occluded.

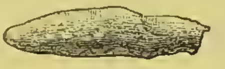

Fig 79.

I have thought that some collections of matter in the kidney might with advantage be drained through an opening in the perinæum, instead of being submitted to other procedures, such as incision from the loin, and even in some instances to nephrectomy. I was first impressed with this belief by observing the relief it was possible to afford to the ureters and kidneys, which were undergoing chronic suppuration as a consequence of tight stricture in the urethra. Cases of this kind, even complicated with rupture of the urethra behind the obstruction and extravasation of urine, have frequently proved so satisfactory to treat, that I felt the principles of treatment which guided us here might with equal advantage be extended to some forms independent of kidney suppuration. Nor have I been disappointed in those instances where I had reason to think that the last mentioned condition was the cause of the purulent state of the bladder for which the operation of perinæal urethrotomy was undertaken. In a paper on this subject* I have referred to ten cases of suppurating pyelitis and ureteritis treated with advantage by this method. Had only one organ been involved, I might perhaps have reached and drained it from the corresponding loin. In one case where I opened the perinæum and drained an extensive suppuration, I found the cause of it was a psoas abscess from caries of the vertebræ which had burst into the kidney. Though large quantities of healthy pus were in this way discharged, the reaction of the urine remained acid throughout, and the patient was spared much pain in voiding this mixture of pus and urine. Dr. Cullingworth † has reported a case of renal abscess caused by a fragment of carious vertebræ ulcerating into the kidney and forming the nucleus of a calculus.

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* *Medico-Chirurgical Transactions*, vol. lxxiv.

† *American Journal of the Medical Sciences*, October, 1884.

In the after-treatment of operations involving the kidneys care must be taken that the antiseptics used are not too strong. Most of us have seen that condition known as carbolurea, where the urine is darkened by the absorption of carbolic acid. Mr. Edmund Owen ‡ relates a case where nephro-lithotomy was followed by severe salivation after mercuric perchloride had been used in the proportion of 1 in 1,000.

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* *Lancet*, Dec. 7, 1889. † *Ibid.*, Jan. 3, 1880.

‡ *British Medical Journal*, Nov. 24, 1888.

Amongst the rarer derangements involving the ureter may be included an instance recorded by Dr. Caillé, of New York,* where the lower end was prolapsed through the urethra in a female child aged two weeks. It was complicated with a small growth, which by pressing on the ureter doubtless caused the prolapse. After death the corresponding kidney was found to have undergone cystic degeneration.

Dr. L. Landau † has drawn attention to some cases of intermitting hydro-nephrosis observed in women, which he connects with a twisting or "kinking" of the ureter belonging to the kidney involved. The symptoms in some degree resembled those of renal colic connected with stone, and were accompanied with tumefaction of a varying character in the region of the kidney. In two of the instances recorded the symptoms disappeared during pregnancy, a circumstance which was explained by the movable kidney being fixed in position by the gravid uterus. In one case relief was afforded by an abdominal bandage. It is in cases such as this that well-directed massage temporarily removes both swelling and pain.

* *British Medical Journal*, Nov. 10, 1888.

† *Berlin Klin. Wochenschrift*, Nos. 47, 48.

TWENTY-SEVENTH LECTURE.

THE FORMATION AND PHYSICAL CONSTITUTION OF URINARY CALCULI.

AN inquiry of this nature is a necessary preliminary to the consideration of the prevention and treatment of stone as it occurs in the urinary passages of males and females. It will be convenient to discuss this subject under three headings: (1) The conditions under which stone is formed, as observed in practice; (2) certain views which have been advanced as to the methods of stone formation; and (3) conclusions which may be drawn as to its prevention.

(1) To broadly study the conditions under which stone is formed, I will take the section of a calculus, made up of more than one variety of typical ingredients, such as is depicted in the accompanying coloured lithograph (Fig. A), taken from a drawing in a well-known work on the subject.* Examination shows that the central portion of the stone consists of a concretion of lithic acid deposited in irregular outline. It will be seen that as the process of stone formation advanced the mass gradually increased in size by the deposition of lithic acid, probably representing a natural, though excessive, product of excretion, until a considerable bulk was attained. Then the margin of the lithic acid, for some reason or other, became extremely uneven, and no doubt excited local inflammation. This was followed by a change in the deposit, in the course of which the rough

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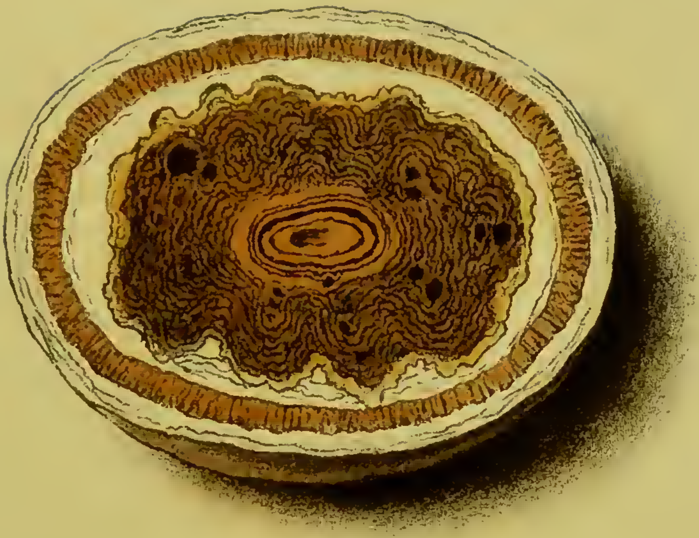
* *A Treatise on the Formation, Constituents, and Extraction of Urinary Calculi* (Jacksonian Prize Essay, 1883), by John G. Crosse. Churchill.

Fig. A.



E. Burgess ch. lith.

concretion of lithic acid was covered in by layers of triple phosphate as effectually as if it had been encased in a mould of plaster-of-paris. In this way the stone was smoothed down by having its inequalities rounded off, inflammation subsided, and the deposition of lithic acid returned and continued until a circumferential band of some depth was again formed. Ultimately the process of lithate formation is again interrupted by the recurrence of inflammation, which was doubtless re-excited within the bladder by the considerable size the stone had now attained.

In this way we may explain the formation of compound or alternating calculi. The clinical histories of many patients I have observed warrant the assumptions thus drawn from an examination of their calculi as to the probable sequence of these events. As botanists and geologists are enabled to explain much relating to the history and age of vegetables and rocks from an examination of their sections and strata, so the pathologist, by a similar process applied to calculi, can describe many of the clinical circumstances which characterise their development and increase—how at one time they progress unostentatiously by an aggregation of that material which represents a constitutional disorder or a diathesis, whilst at another their appearance and the massing of phosphates upon them speak of intense vesical irritation, alkaline and offensive urine, and such-like local distress; and what appears to be true of lithic acid stones applies to other varieties of calculi, with the exception of the triple phosphate, which seems to be, either independently or relatively to other calculi of which it may form a part, a product of inflammation. The latter conclusion is supported by a reference to those numerous experiments which both men and women are frequently trying upon themselves. If a foreign body is introduced into the bladder and allowed to remain there, as illustrated in the Fourteenth Lecture, inflammation is excited, the urine undergoes decomposition, and phosphates are thrown down and deposited upon whatever may be occupying the interior of the viscus. This observation is of interest, as it cannot be doubted that the process of phosphate formation occurring under these circumstances is really a conservative one, having for its object the encasing of that which is foreign and irritating to the bladder. It will be noted that under all states of inflammation in connection with foreign bodies, of whatever kind, the formation that takes place is invariably phosphatic, this process possessing the power of immediately, though temporarily, suspending any other deposition which may have preceded it, as observed in the case of rough calculi.

Exception may be taken to this statement on the ground of a solitary instance to be found in the Museum of the Royal College of Surgeons (A 126), to which this descriptive note is appended: "It consists of pale-coloured uric acid mixed with urate of ammonia deposited upon a slender piece of steel, which appears to be a portion of a stylet. From the manner in which the layers of the calculus surround the nucleus, there is no reason to suppose that the piece of steel has been introduced within the calculus, although the deposit of uric acid or any other substance, save the earthy phosphates upon foreign bodies in the bladder, is a very unusual occurrence." From an examination of this specimen I am disposed to think it may possibly not turn out to be an exception, as it seems there is, or has been, a thin layer of phosphates intervening between the foreign body and the mass of stone in which it is now somewhat loosely embedded. Whether this opinion is correct I cannot positively say, but I am unable to find any other specimen which substantiates what this is supposed to do. We are, I believe, justified in concluding that all urinary calculi may be, and usually are, formed independently of inflammatory action, with the exception of the triple phosphates. In the latter some degree of inflammation appears essential in the process. Though there may be nothing new in a generalisation of this kind, the fuller recognition of the circumstances under which calculi are formed, relative to the absence or presence of inflammation, is of importance, particularly in reference to some points connected with treatment, as will be shown.

As supporting the view that there are some variations in the process of stone formation, and that conditions favourable to one form appear to be antagonistic to others, Sir William Roberts[*] has pointed out that bacterial states associated with the lactic fermentation as observed in saccharine urine are inimical to the bacillary life which is a concomitant of the ammoniacal fermentation. This raises the suggestion that triple phosphatic stones are not likely to be formed by persons suffering continuously from glycosuria, where the lactic fermentation is predominant. The practical application of this point to which attention is directed will be again referred to later on, in connection with the subject of recurring calculi after operation.

The relation of micro-organisms to chemical changes taking place in certain fluids of the body, for instance those in the secretions of the mouth in connection with salivary calculus, and those in the bladder and associated parts with urinary concretions, is receiving attention. Though the subject is not yet in a stage permitting much practical application, beyond what has just been referred to, the papers of Mr. H. Robinson[†] and the more recent one of Dr. Galippe[‡] may be studied with advantage, and further investigations will doubtless be carefully watched.

(2) I will now notice certain views relative to the methods of stone formation. From a clinical aspect it would appear that there are at least two ways in which

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[*] "A Case of Lactic Fermentation in the Bladder," *Lancet*, Feb. 25, 1893.

[†] *Proceedings of the Cambridge Philosophical Society*, May 20, 1889.

[‡] Academy of Sciences, Paris; *(vide) British Medical Journal*, May 20, 1893.

concretion is brought about by coalescence of particles supplied by the urine; one, independently of any inflammatory contribution, and another where inflammation is obviously a part of the process. In reference to the former, considerable light has been thrown on the subject by the researches of Rainey,[*] Ord,[†] and Vandyke Carter.[‡] These observations point to the probability of stone being formed in the urinary passages by the concurrence of conditions which, though not necessarily in themselves morbid, may be said to contribute towards the production of that which is hurtful. They may be briefly summarised as tending to show that some salts, in the presence of a colloid material such as gum or albumen, yield, not crystals, but certain bodies to which Carter has applied the term "submorphous," having the peculiarity of adhering not only to existing surfaces, but also to each other, in laminar series. In the urine may constantly be observed lithates presenting an appearance similar to these submorphous forms, and the presence of an organised material partaking of the nature of a colloid has been demonstrated as existing in a large proportion of urinary calculi. In reference to the production of a calculus by molecular coalescence, Dr. Vandyke Carter remarks: "Regarding, first, the probabilities of the case, it seems to me that the necessary conditions for the operation of molecular coalescence may at times occur in the living human subject; thus an excess of mucus, perhaps altered in character in the urinary passages, or the effusion of albumen, fibrine, or blood and the like, say from congestion of the kidneys or from irritation of the urinary tract, would furnish a colloid medium, with which uric acid, the urates, or oxalates themselves, perhaps in excess, could combine in the manner before described." Added to this is a note from Rindfleisch (vol. ii., p. 143): "I have long been in favour of the view that the epithelial cells with which the straight tubes are lined generate a colloid material in their protoplasm, which they pour out in the interior of the tubes."

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[*] "Precise Directions for the Making of Artificial Calculi, with some Observations on Molecular Coalescence," *Trans. Microscopical Society of London*, vol. vi., 1858.

[†] "On Molecular Coalescence, and on the Influence exercised by Colloids upon the Forms of Inorganic Matter," *Quarterly Journal of Microscopical Science*, vol. xii., New Series, 1872.

The Microscopic Structure and Formation of Urinary Calculi, 1873.

Carter further observes, relative to this process: "With regard to some *shell structures*, it will be sufficient to remark that compact and even incipient layers often bear such a close resemblance to the product of experiment that it is affirmed the intervention of cell-influence is not needed to account for their formation (Rainey and Harting); and some of these layers being very similar in character to those found in urinary calculi, the inference is again in favour of the latter originating in a manner essentially identical. Analogical evidence of this kind tends therefore to support the view of the non-vital origin of the submorphous structures named, notwithstanding their association with living organisms, or with matter once part of such."

That a formative act such as is here referred to is actually going on within the human bladder is also rendered probable from the examination of stones immediately after they have been removed entire, as by lithotomy. It will be found they are covered with a distinct layer of viscid mucus, which often adheres with such tenacity as to require washing, with friction, before it can be entirely removed. The conditions under which this process of stone formation by molecular coalescence proceeds seem not yet determined. That there is some affinitive attraction between the various kinds of inorganic particles engaged which may be regulated by those in excess, through the medium of the colloid, is not improbable, otherwise it would be difficult to understand how grouping takes place with such precision. The view thus entertained as to the formation of calculi by molecular coalescence through the intervention of colloid has had weight incidentally given to it by some remarks of Mr. Cadge in his address before the British Medical Association.* Referring to matters connected with diet, he observes that "the prevalence of stone amongst the children of the poor is largely due to their not obtaining a proper and sufficient supply of sound milk," and that the abundance of stone in children "will be found in strict accordance with the difficulty of procuring milk." That is to say, in place of a fluid food which is generally regarded as unirritating to the urinary organs, others are substituted of an opposite nature, and thus the urinary mucus is considerably increased. I have had frequent opportunity for verifying this observation. Dr. Plowright,† more directly, supports the colloid view, but from a somewhat different standpoint. In reference to the use of salt as an article of diet, he observes: "(*a*) That the presence of salt greatly increases the solubility of uric acid; (*b*) that the consumption of salt by increasing thirst insures a larger amount of fluid passing through the urinary tract, and therefore lessens the probability of calculus; (*c*) that by keeping the colloids equally diffused salt tends to prevent the cystalline solids of the urine from agglomerating into calculi." Dr. Plowright found from experiment that the addition of two per cent. of salt quadrupled the solubility of uric acid.

It has long been noticed, as Prout remarked, that "hard waters have a great influence in producing stone." Mr. Cadge also observes that "the balance of evidence was in favour of stone cases being connected with hard drinking water." In various neighbourhoods, I am told, the change from a hard to a soft drinking water by the substitution of an artificial supply has resulted in a considerable diminution of stone cases. From some observations, I have noticed that corresponding variations in the quality and quantity of urinary mucus follow the drinking of waters of different degrees of hardness.

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* Annual Meeting at Norwich, 1874.

† *On the Cause and Distribution of Calculus.* Illustrated with coloured Maps showing the Distribution and Rainfall in England and Wales. Nos. i. and ii. 1885, 1886.

Assuming that eight or ten grains of so insoluble a deposit as lithic acid is daily excreted,* it seems to me that there is not an individual in fair health who is incapable of forming a stone in a reasonable time, provided that the circumstances for concretion are favourable. If, for instance, a man in the habit of excreting ten grains of lithic acid a day was only to void half this with his urine, and concrete the remainder, it is obvious he might form a stone of this material alone, weighing not less than half an ounce, in something like forty-eight days. In a woman the probabilities of her forming a stone are very considerably less, not because she necessarily excretes less lithic acid, but by her different mechanism for urination, not to say anything of the absence of a muscular ring or buttress at the neck of the bladder like the prostate. In her case the earlier nuclei of stone are tolerably sure to make their escape from the bladder, as it is only when a calculus too large to pass through the urethra descends from the kidney that the possibility of an increase, in this position, is at all likely to occur. The rate at which triple phosphates will concrete in both sexes, owing mainly to the rapidity with which they are capable of being produced, is sometimes very remarkable. Though lithic acid may be the predominating calculus of the Eastern counties, I do not see it asserted that the urine of the inhabitants contains it in excess as compared with those residing in other districts. In the expression, "it may be that the abundance of stone in Norfolk is due not to actual excess, but to circumstances which merely determine the precipitation and separation of lithic acid in the urinary tract," Mr. Cadge † almost offers the explanation I am venturing to lay some stress upon.

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* *On Urinary Diseases*, by Sir William Roberts. Fourth edition.

† *The Etiology and Distribution of Stone in the Bladder*, 1874.

On grounds such as I have referred to, I believe there is much practical value in the views based on the colloid theory relative to the formation of stone. It certainly offers a reasonable and demonstrable explanation, founded on what appears to be a precisely analogous process, of the fact that stones are formed in the human body not by the aggregation of salts the elements of which are foreign to the system, but of those whose natural province it is for the kidneys to excrete in not necessarily excessive quantities.

The other process of concreting differs from the foregoing as it is dependent upon inflammation, it being requisite for the formation of a triple-phosphate stone that the inorganic element composing it should first be precipitated by the decomposition or rearrangement of the urine. When this has been accomplished, then the coalescence of the gritty particles may be brought about as in the preceding manner.

Let me take an instance where a foreign body, such as a piece of bougie, is introduced and left in the bladder. Inflammation is excited with greater or lesser activity in accordance with the nature of the irritant, the urine becomes alkaline and ammoniacal, and phosphates are deposited in quantities by precipitation, sufficient in the course of time to completely encase the cause of the inflammation. It is possible that after the earthy salts have been precipitated their concretion may be brought about by molecular coalescence; and what is capable of being thus studied may also be seen in connection with the treatment of urinary calculi, as in the following case:—

Case.—It was that of a gentleman of rather over middle age, of decided gouty habit, who voided considerable amounts of uric acid in the urine. When about 60 years of age the gravel disappeared, and in the course of four years a stone in the bladder was detected, and successfully removed by crushing. Beyond occasional slight hæmorrhage after exercise he never had any other symptom of stone. I saw the fragments of the stone removed, which were those of pure lithic acid without a trace of triple phosphates. Within a few weeks after this operation symptoms of cystitis gradually set in, and I removed, by crushing, a pure white phosphatic stone about the size of a cob-nut. The patient was taught how to wash out his bladder, and I do not think he has had any further recurrence.

In this case three theories were propounded as explanatory of the recurrence of stone, for none of which was there sufficient foundation. The first was that a fragment had been left behind at the previous operation; this could not be, as the two stones had no resemblance either in appearance or composition. The second suggestion was that the bladder had been injured, and inflammation set up; this was improbable, as recovery from the first crushing was rapid and complete, and no bladder symptoms appeared for some weeks afterwards. The third theory was that a fresh stone had descended from the kidney; this was not likely, as all previous concretions had been unmistakably lithate. The more probable explanation was that the first stone had been removed from behind an enlarged prostate, where, on a renal nucleus, it had been quietly growing by the gravitation of the lithic acid; on its removal the place it occupied was never completely emptied of urine, the latter, decomposed, became ammoniacal, and the result was a phosphatic stone formed on a nucleus furnished by portions of inflammatory lymph. The point I wish to emphasise in connection with the case is this: How was it in a man, proved to be strongly disposed to the formation of lithic acid, that the reproduction did not assume this form? Why was a white phosphate substituted for a red lithate? My reply is, that the inflammation arising out of decomposition going on in the bladder is inimical to a primary process of molecular coalescence.

Again, I met with an instance where, from an examination of a calculus after its removal by lithotomy, the section showed that it had originally consisted of pure lithic acid, which had become broken, accidentally or spontaneously, in the bladder, and subsequently united by means of triple phosphate. The clinical history supported this construction, as a short time before the operation the patient had suffered from sudden and acute cystitis, which did not entirely abate till the stone was removed. Objection may be raised against this theory of stone formation, in less obvious instances, on the ground that it necessarily implies a more or less continuing state of alkaline, if not ammoniacal urine in association with the formation of a phosphatic stone, which is not always demonstrable. It must, however, be remembered that the amount of urine a normal sized bladder usually contains is sufficient to neutralise the alkaline contents of a small sac. Because the bulk of the urine contained in the bladder furnishes an acid reaction, this by no means implies that there is not a local contingent presenting the opposite characteristics. This point will be again referred to in connection with stone relapses after operation.

(3) Proceeding to some conclusions which may be drawn from observations relative to the prevention of stone formation, whatever theories may be advanced there are certain facts which cannot be disregarded. Mr. Cadge, from his great practical experience in a stone district, has pointed out an instance where errors in diet appear to be largely responsible for the frequency of stone in young children. The withdrawal of milk and the substitution of coarser foods and drinks, which must be irritating to the urinary passages, and favour the increase in the urine of that which may act as a colloid, has already been referred to. Passing to the other extreme of life where stone is still most frequently met with, it seems reasonable that in elderly males who from a gouty habit are accustomed to excrete an excess of lithic acid, the

concentrated condition of the urine, combined with the obstacle that the gradually enlarging prostate offers in completing micturition, should provide conditions favourable to concretion by molecular coalescence. It is under these circumstances, as Sir William Roberts has more recently pointed out in his Croonian Lectures (1892), that care should be taken to diminish the amount of lithic acid excreted, not only by diet and exercise, but by the use of diluents to prevent that concentration of the urine, where the salts as well as the mucus are in excess, becoming habitual. It is in furtherance of these objects that the use of mineral waters either at home or abroad are to be recommended. It is hardly necessary to again refer to the considerable amount of weighty testimony that indicates the importance for securing a proper drinking water supply for districts as well as for individuals. That certain hard waters, whatever the explanation may be, favour the production of stone, I do not think there is a doubt of; whilst in regard to persons who, from constitutional or dyspeptic causes, or by hereditary tendency, are liable to crystalline deposit in the urine, in whatever form it may reveal itself, the latter fact is of much moment. That stone in children is almost limited to those of the poor, and is rare amongst those of the better off, whilst the converse holds good at the other extreme of life, are conclusions which appear to be quite in keeping with the views I have endeavoured to support relative to matters connected with both eating and drinking.

In reference to the formation of the triple-phosphate stone, it must be remembered that it is impossible to dissociate this from a continuing cause for local inflammation, involving some portion of the urinary tract; it may be in connection with a diathetic stone, or entirely independent of it, as we see in cases of pouched bladders in which the urine gravitates and decomposes. That a nucleus is required for the stone to form on I do not for a moment deny, but this the bladder itself when diseased is capable of furnishing, irrespective of other agencies. It is under these circumstances in the prevention of stone we are largely dependent upon those means which are referred to in the Twenty-third Lecture in connection with the ablution and medication of the bladder. Though the presence of residual urine, arising either, for instance, in connection with urethral stricture or prostatic obstruction, need not necessarily render an individual liable to the formation of a stone, care must be taken not to allow the excretion to undergo ammoniacal decomposition in the bladder or in any of its recesses, and thus to furnish another link in the chain necessary for bringing this about. Observation will also be required, particularly in the case of persons who are in the habit of passing lithic acid gravel, that no obstacle is offered or arises to the free escape of the urine containing these or other crystalline bodies by the quiescent development of the two sources of ante-vesical impediment to which I have just referred. In these directions the physician and surgeon, as well as the medical officer of health, will find ample scope for their efforts.

Remarks on the formation of calculi may advantageously be followed by a reference to what may be called their self-destruction. If it could be shown that such effects are due not to accidents, as falls or blows, but to spontaneous physical or chemical changes in the composition of the stone, we might provide ourselves with data which would be of assistance in the treatment of calculi by solvent and other agencies. Cases of spontaneous fracture have been recorded by Dr. Ord, the late Mr. Southam, and other observers.* Amongst these, instances are not included where a stone in the bladder has been fractured accidentally by a fall or a concussion, as by jumping from a carriage, but where there are reasons to believe that other forces have been at work—

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* *British Medical Journal*, Jan. 4, 1868.

such, for instance, as the case stated by Dr. Ord, where he remarks: "I maintain, therefore, that the fresh specimens support the idea which I advanced upon examination of the first, that in a changed state of urine the nucleus had become swollen, and acted as a bursting charge in a shell." * It is probable that something of this kind occurred in the following case:—

Case.—A gentleman, aged about 60, with an enlarged prostate and a slight stricture arising from injury, was under my care for difficulty in micturition. It was also suspected that he might have a stone in the bladder. The patient was so much better for the treatment his stricture received that he contented himself with occasionally passing a soft bougie, and failed to have his bladder explored. Some months afterwards he called to say that the suspicion was well founded, for after some trouble he had passed a stone in several fragments, and was now well. He brought me two of the fragments he had passed, having, to my regret, thrown the others away. I found them to be portions of a compound calculus of some size, which had probably undergone spontaneous fracture, and thus escaped from the bladder.

Dr. H. J. Bigelow suggested † that "calculi can be broken by the contraction of a thickened bladder, much as English walnuts are cracked in the hand." Dr. Ord concludes that there are three ways in which a calculus may spontaneously fracture: (1) From forces arising within the calculus itself; (2) from molecular disintegration; (3) from weakness of the layers within the crust allowing of its fracture.‡ In reference to the second mode of disintegration, it is probably effected by some altered relation in the colloid to the salt, by which cessation of cohesion, erosion, or falling to pieces

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* *British Medical Journal*, Sept. 7, 1878.

† *Boston Medical and Surgical Journal*, Dec. 9, 1886.

‡ *British Medical Journal*, May 10, 1879.

is brought about.* Dr. Matthew Dobson, F.R.S.,† appears to have founded some views on observations derived from a knowledge of the spontaneous fracture of calculi under the circumstances to which I have referred. In the course of his remarks he speaks of changes observable in calculi exposed to the action of altered states of the urine, which had been brought about by the use of waters containing fixed air, similar in character, I take it, to certain German spa waters. The effects upon the calculi so treated appear to be in imitation of those observed in connection with their spontaneous fracture, rather than as arising from the action of solvents. The communication is of interest, as bearing upon views more recently advanced on the treatment of calculi by lithontriptics.

Of the chemical composition of calculi I shall not say much. With some rare exceptions they may be said to consist of urates, oxalates, and phosphates. From their hardness, oxalate of lime stones are least fitted for lithotrity, whilst, by reason of their softness, the phosphatic ones are easiest crushed. The "ring" of the calculus often indicates to the surgeon, when he touches it with a sound, the probable nature of its composition; the sharp "click" of the hard stones contrasting with the duller "thud" of those composed of more or less phosphates. When a stone is seized by the lithotrite, the first grip or feel must not be regarded as deciding its composition throughout, as some of the hardest stones have very soft exteriors.

For the analysis of calculi, the table of Professor J. Campbell Brown, of the Liverpool University College, will be found convenient. I have his permission to append it.

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* "Mr. Rainey has made known observations on the dissipation of the submorphous globules composed of lime carbonate, which claim notice in this place because of the light they throw upon the possible disintegration of calculi within the bladder."—Dr. H. Vandyke Carter, *op. cit.*

† *A Medical Commentary on Fixed Air*, 1787.

Table for the Examination of Urinary Calculi.

1. Heat a portion of the powdered calculus upon platinum foil.

Destroyed. (*a*) *Uric acid: Ammonic urate: Cystine: Cholesterin: Bile-pigment.*
(*b*) Uric acid from *Calcic* and *Sodic urates.* Ammonia from *Triple phosphate.* Oxalic acid from *Calcic oxalate.*

Not destroyed. (*c*) *Calcic phosphate: Calcic carbonate.*
(*d*) Calcic carbonate from *Calcic oxalate* and *Urate.* Sodic carbonate from *Sodic urate.* Magnesic phosphate from *Triple phosphate.*

If it chars and gives an odour of burnt feathers, add to another portion a drop of concentrated nitric acid and evaporate to dryness: pink colour; cool and add ammonia: purple colour; *Uric acid* or *Urates.* If the odour is peculiarly disagreeable, resembling carbon disulphide, dissolve in ammonia, and allow the solution to evaporate spontaneously; microscopic six-sided plates indicate *Cystine.* Mix another portion with lime; ammonia may be evolved from the *Urate* or *Triple phosphate.*

2. Ignite another portion in the blowpipe flame until it burns entirely away—Class (*a*), see above—or leaves a white residue—Classes (*c*), (*d*). If it fuses, it consists of the mixed *Phosphates of Calcium, Magnesium,* and *Ammonium.* Place a portion of the residue on red litmus paper and moisten with a drop of water; alkaline reaction indicates *Soda* or *Lime,* from Class (*d*), or from *Calcic carbonate.* Dissolve the rest of the residue, remaining after ignition, in water, and filter. If the filtrate is alkaline, add a drop of hydrochloric acid, and evaporate cautiously to dryness; microscopic cubical crystals prove the presence of *Sodium.* Dissolve any residue insoluble in water, by nitric acid, observing whether or not effervescence due to carbonic acid takes place; add a comparatively large quantity of ammonic nitromolybdate, and heat; a yellow crystalline precipitate indicates *Phosphoric acid.*

3. Boil a portion of the powdered calculus in dilute hydrochloric acid; effervescence indicates calcic carbonate; filter; precipitate by ammonia, and add acetic acid in excess; a turbidity remaining undissolved indicates *Calcic oxalate.* To the clear solution (or to the filtrate if calcic oxalate is present) add ammonic oxalate; a precipitate indicates *Calcium, which was not previously in the state of oxalate;* filter, if necessary; add ammonia, stir, and allow to stand for ten hours; a white crystalline precipitate indicates *Magnesic phosphate.*

The size of calculi varies much, from the small bodies which appear in the urine, and are spoken of as "gravel," up to masses weighing many ounces. When we consider that all stones originally were small, too much importance cannot be attached to their early detection and treatment. The crushing of a stone that has recently made its escape from the kidney into the bladder is an operation as certain as it is safe; and after an attack of renal colic, which has probably been caused by the passage of a calculus, unless there is evidence of the stone having escaped naturally by the urethra, the bladder should be searched and the stone crushed. Small stones can often be withdrawn entire through an evacuating catheter by the aid of an aspirator, thus avoiding the necessity for the use of the lithotrite and the chance of any sharp fragment being left behind in the bladder. Patients are often conscious of the dropping of a stone from the ureter and its retention within the bladder.

Amongst enormous calculi of recent date, reference may be made to a lithic acid one removed by Dr. J. T. Morrison,* which weighed over one pound six ounces, and was withdrawn with a pair of midwifery forceps through a supra-pubic opening. Though the patient at first promised to do well he died on the tenth day after the operation. Sir Henry Thompson has recorded an instance where he successfully removed by the supra-pubic operation a lithic acid calculus weighing fourteen ounces.* Dr. A. Patterson narrates a case where a man spontaneously expelled through a perinæal fistula, which had remained after a rupture of the urethra from a fall, a phosphatic calculus weighing over fourteen ounces. Another curious part of the case was that the patient himself by means of a chisel had previously removed a portion of the stone through the sinus. He lived eleven years afterwards, but the false route never closed.†

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* *Trans. Northumberland and Durham Medical Society,* Nov. 12, 1885.

The shape assumed by calculi is sometimes remarkable, as seen in the two following specimens. The first (Fig. 80) was removed by the late Dr. Lowndes, by lateral lithotomy, from a boy at the Liverpool Northern Hospital, and weighs over an ounce; the anterior portion of the calculus seems to have been cast within the prostatic portion of the urethra, the urine escaping by the side of it. The other specimen (Fig. 81) was removed by Mr. Rushton Parker from a patient who had suffered from it for a considerable period. Here the calculus appears to have occupied the place of the prostate, the urine escaping through a channel in the stone, corresponding in direction with the continuity of the urethra.‡ It weighed over nine drachms, and the patient made a good recovery. A similar case is recorded by the

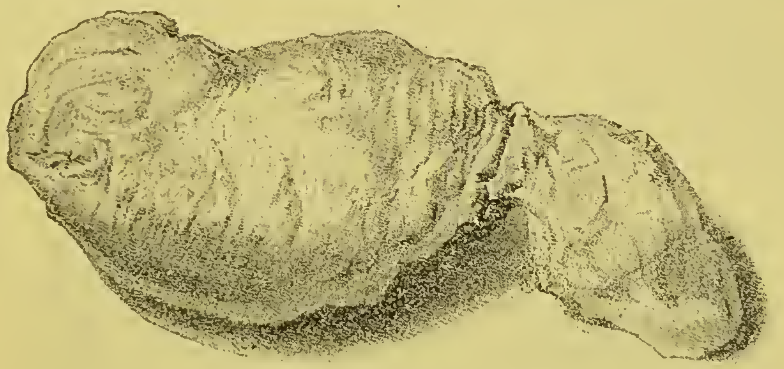

Fig. 80.

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[*] *Lancet*, July 18, 1885.

[†] *Glasgow Medical Journal*, June, 1884.

[‡] *British Medical Journal*, Jan. 19, 1878.

late Mr. Sympson, of Lincoln, where a channel was made in the calculus through which the urine passed.* I have not met with an instance where there was evidence of a stone being adherent to the mucous membrane of the bladder, but I have seen a case where one of the spikes of an oxalate stone (Fig. 82) was so embedded in the mucous membrane as to give rise to this impression.

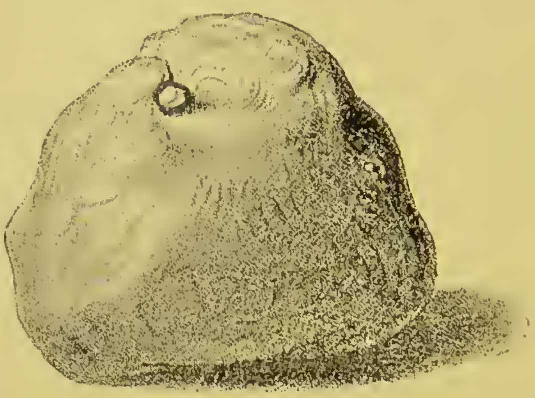

Fig. 81.

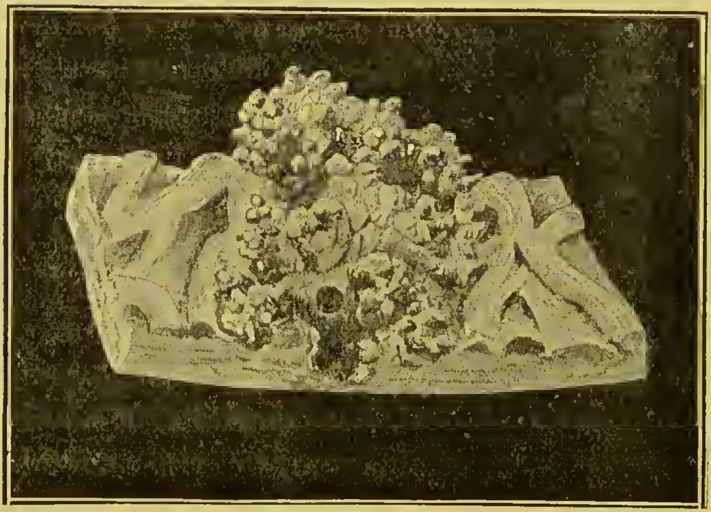

Fig. 82.

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* *British Medical Journal*, March 23, 1878.

Instances must be extremely rare where a calculus has been the means of penetrating or rupturing the bladder wall consequent on the application of force to the body. This, I believe, happened in the following case :—

Case.—It was that of a boy, age 14, whom I saw in 1890 in consultation with Dr. Woodforde. He had suffered for years from an irritable bladder, and pain following urination, but nothing appears to have been done for him, his parents not wishing an examination to be made. Four days before I saw him, when playing in the garden, he fell heavily on his perinæum astride some palings, and then on to his side. This was followed by swelling of the supra-pubic region, extending to the penis and scrotum, and partial retention of urine. When I saw him the supra-pubic tissues and the skin of the penis were gangrenous, and the scrotum distended. The perinæum was flat and not œdematous, as usually seen when rupture of the deep urethra from injury occurs. I could not pass a catheter, for the reason that the glans penis was entirely concealed by an œdematous and sloughing prepuce. As it was clear that extravasation of urine had occurred under unusual circumstances the patient was put under chloroform. I then proceeded to deal with the different points where relief was obviously required to let urine and disorganised tissues escape. This enabled me to introduce a silver catheter into the bladder and to feel a stone. I therefore cut down in the median line on the silver catheter, and with an ordinary pair of dressing forceps, and my finger in the rectum, I succeeded in extracting a stone (Fig. 83) of a torpedo shape, weighing nearly three drachms. It was composed of light-coloured uric acid with a

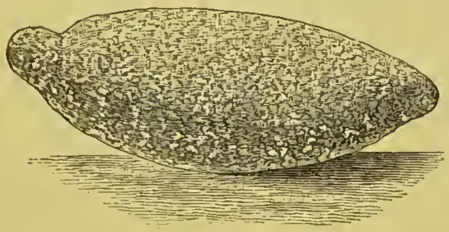

Fig. 83.

coating of phosphates. I have no doubt the stone penetrated the bladder immediately behind and below the pubes at a point corresponding with what is commonly called the neck. This permitted urine to be effused into the space known as the porta vesicæ of Retzius, and occasioned the effects mentioned. The free drainage which the lithotomy wound provided was an important item in the progress of the case. Though there was considerable sloughing of the prepuce and skin of the penis, scrotum, and supra-pubic region, the patient made a rapid recovery.

The case is unique, so far as my experience goes, for though instances have come under notice where calculi have made their way through the perinæum by a slow process of inflammation and suppuration, I am not aware of an instance where the bladder has been actually penetrated by a stone it contained in the way described.

TWENTY-EIGHTH LECTURE.

Stone in the Bladder—Symptoms and Sounding.

A stone in the bladder usually indicates its presence in a variety of ways, any one of which may be sufficiently significant to lead the surgeon to proceed to determine its position by demonstration with the hand and the ear. A calculus is, as a rule, a source of more or less constant irritation; it frequently provokes hæmorrhage, especially after exercise, and it is generally associated with some reflex pain, of which that at the end of the penis is the most constant. Though in the majority of cases these symptoms are more or less combined in varying degrees, we occasionally meet with instances where there is perhaps only one prominent indication. In male children it sometimes happens that constant preputial irritation, or prolapse of the rectum, is the only symptom suggestive of the presence of a stone in the bladder. A patient when he first came under observation only complained of slight hæmaturia after taking a long walk, which he usually did once a week. The constancy of this symptom in connection with his long walk was suggestive; he was sounded, and a lithic acid calculus detected, which was removed by crushing, when the hæmorrhage disappeared. It is curious to notice that very large stones not unfrequently give but slight symptoms of their presence. In some cases, where stones weighing many ounces have been removed by the supra-pubic operation, the patients appear to have suffered but little inconvenience from them, probably because, by reason of their size, they became almost stationary.

It being important to detect a stone in the bladder in its earliest stage, we should not sanction the treatment of a case of vesical irritability, otherwise unexplainable, without sounding the patient. It is impossible for any one to conclude from symptoms alone what a bladder may contain until a sound has been introduced, when positive evidence is afforded.

Sounding may be practised under the following circumstances, when the cause is not otherwise explicable, or symptoms pointing to the bladder continue in spite of treatment:—(1) In children suffering from vesical irritability, incontinence of urine, sudden interruption to micturition, retention of urine, blood in the urine, penile irritation inducing the pulling of the foreskin, and prolapse of the bowel. (2) In the vesical irritability of adults after attacks of renal colic, where there are reasons for believing a calculus may be retained in the bladder. In cases of hæmaturia of a doubtful nature, or of chronic muco-purulent or ammoniacal urine, or where the urine contains, on standing, an excess of cloudy mucus. (3) In pain after micturition, referred to the end of the penis. (4) In the enlarged prostate of elderly persons, with persisting symptoms of vesical irritability. (5) Where calculi, or portions of them, have been spontaneously passed, and symptoms of irritation continue. (6) In cases of acute vesical spasm terminating the act of micturition, or where, though the bladder contains but little urine, there is frequently a sudden and uncontrollable desire to micturate. Though the indications of stone may be numerous, it will be seen that they all have reference to either a persisting source of irritation within the bladder, or a mechanical interference with the act of micturition. In bygone days the modes of ascertaining whether a patient had a stone in his bladder were very primitive. An old practitioner told me that an eminent surgeon of the last century often grounded his opinion upon this point by the manner in which the person conducted himself on being desired to jump on the ground, from, say, the height of a chair. Now, the process is conducted on very different lines.

As a rule, I prefer patients when sounded having an anæsthetic, not because the process is necessarily a painful one, but for the purpose of making a complete examination. Formerly, on its detection, when there was only one method of operating for stone, its removal by lithotomy naturally followed. In the present day, where the choice of proceeding has been extended, more precise information is required before we can determine whether the stone in a given case will be better removed by a crushing or a cutting operation. In advising an anæsthetic it is not merely on the grounds that the process of searching may be a disagreeable one, but mainly for the reason in cases of difficulty that a complete relaxation of the parts may be secured. Large rigid prostates and contracted bladders are sources of error which can only be completely removed by an anæsthetic. But if on sounding the patient it should be proved he has not a stone in his bladder, we are often none the less dependent on the information the use of the sound affords for our future guidance. In some cases we have to eliminate the possibility of disease in the bladder or the parts below, before the physician can undertake their sole responsibility. In others, though there is no stone, there may be tumour, tubercle, or ulceration, which the skilful use of the sound can aid in determining. Hence, as a rule, sounding must be conducted with that deliberation which can only be done when an anæsthetic is employed. When it is not administered much of the sensitiveness of the deep urethra may be removed before passing the sound by a preliminary injection of a ten per cent. solution of cocaine.

In the majority of instances, I believe it would be better practice to sound and remove the stone at the same time. In persons with fairly normal bladders the gentle movement of the stone with the sound is a matter of little consequence; but with stones more or less fixed in one position—as is so often the case where the prostate is large and the bladder pouched—the conditions and risks are very different: urine gets into the depression the stone has so well filled, some cystitis is set up, there is an unnecessary delay which is trying to the nerves and the sensations of the patient, the sleep is disturbed, and the surgeon finds himself almost obliged to operate (most probably by crushing) with a bladder, as well, perhaps, as the dilated parts above, infected with some of the worst specimens of bacteria. In a personal experience of lithotrity now amounting to considerably over 300 cases, I have noted that not a few of the most rapid and complete recoveries followed when sounding and removal were concurrent. One anæsthetic covers the whole procedure, and the patient is spared needless suspense.

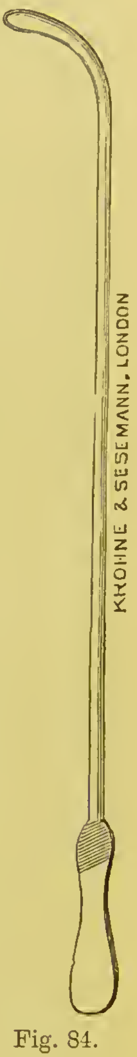

Fig. 84.

In the selection of instruments for sounding we all have our preferences as regards curves and construction. I use solid steel, nickel plated, not exceeding a No. 8 English bougie, of the shape here shown (Fig. 84). Some sounds are so thick in the shank that they actually *fit* the urethra, and consequently the bulb of the instrument cannot be made to pass as easily as it should do over all parts of the mucous membrane of the bladder, including the dip behind the prostate. As a rule, sounds are too short. Where the prostate is large they should not be less than fourteen inches in length. I have no partiality for what are described as hollow sounds. Unless there is some necessity for combining a catheter with an explorer I would sooner not incur the risk of admitting air into an organ where it may do harm by aiding to cause decomposition. Though it is usually desirable to have some fluid in the bladder when sounding, this can generally be secured by other means. A combination of the sound with the stethoscope has been suggested by Dr. J. M. Davidson.* Reliance in the detection of stone is mainly to be placed on the educated touch—the *tactus eruditus*—yet in doubtful cases advantage may be taken of an instrument such as this, by which impressions are not only conducted, but intensified.

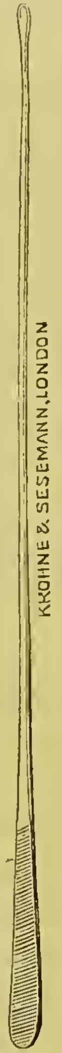

Fig. 85.

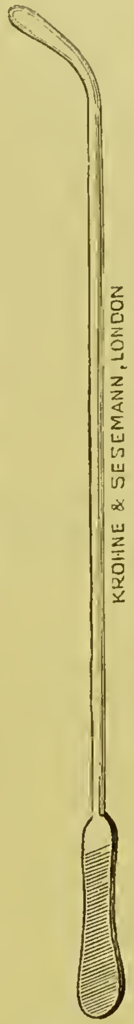

Fig. 86.

A careful study of the alterations effected in the passage by which the bladder is entered in prostatic enlargement leads me to conclude that some variations in the shape of sounds is desirable, though these structural obstacles usually disappear under an anæsthetic. A long copper probe, sufficiently flexible for adaptation to any shape required, is an instrument I have used in cases such as these (Fig. 85). We know how a slight alteration in the curve makes all the difference in the facility with which the bladder is entered when the prostate is enlarged or the urethra distorted. Bigelow used to search for stone with a block-tin sound, bent extemporaneously to suit the case. Here is a shape, like a coudé catheter, that often passes, and can be easily rotated (Fig. 86). I sometimes use a flexible sound tipped with steel, which, though not so sensitive as the metal instruments, has the advantage of adapting itself to the curvature of the prostatic urethra and bladder, whilst it is capable of eliciting a "note" and determining the presence of a stone (Fig. 87). In detecting the stones occupying unusual positions in the bladder, say, for instance, above the pubes, I do not know a more valuable sound than an ordinary gum-elastic (old-fashioned) catheter used without a stylet. I have often demonstrated how readily a stone lying in some out-of-the-way position can be felt with it.

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* *Lancet*, July 1, 1882.

I generally pass a whip or soft bougie before introducing the metal sound. By this device the closed urethra is opened and greased, and the more rigid instrument will then slip in easier; this is equally important, whether or not an anæsthetic is used, as it is desirable that no damage should be inflicted on the parts traversed. Where the prostate is large this object is not so easily attained, and therefore these precautions are not superfluous.

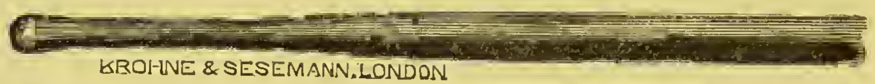

Fig. 87.

Before sounding, an examination of the urine is desirable. Where there is any degree of kidney complication, rest in bed, warmth, diluent drinks, and doses of aconite or quinine have frequently prevented or moderated uncomfortable symptoms following sounding. To sound persons, as a rule, in your consulting room, when seeing them for the first time, and perhaps fatigued by a journey, is incurring a risk which is often unnecessary, and which you may have cause to regret. In sounding, let it be remembered that the instrument is merely an imperfect substitute for the finger, and to obtain the information required it will be necessary to conduct the operation with the same method as we should adopt in the digital examination of any cavity or space in the body which can be so reached. To pass a sound into the bladder, and aimlessly move it about on the chance that it may touch a stone or reveal a rugged or ulcerous surface, is not likely to be of much service.

Should there be a stone, its presence will probably be recognised both by the touch and the ear. A stethoscope applied over the pubes renders the sound more audible, and may be resorted to if there is doubt. The size of the stone can generally be ascertained by the lithotrite, whilst its probable nature is indicated partly by the character of the note that is obtained; the dull "thud" of the phosphates is as characteristic as the sharper "click" of the oxalates or urates; and, further, the examination of the urine often adds evidence which is conclusive. Where there is a suspicion of a stone, which cannot be detected by sounding as described, an examination may be made on a subsequent occasion, with the patient in a different position. The sound may be passed with the patient standing and leaning forward, with his hands on the back of a chair, and his legs apart, or even when lying on his belly.

The difficulties which arise in making a diagnosis of stone in the bladder are for the most part traceable to the existence, as a complication, of one of the following conditions: First, the presence of a stricture or an enlarged prostate; secondly, a diverticulum, or recess within the bladder, in which a calculus may be lodged; and thirdly, the coating of the stone with an imperfectly organised leather-like substance, which conceals it from detection with the sound. Attention has already been drawn to the possibility of an enlarged prostate serving to conceal a calculus, unless special care is taken in sounding to avoid such an error.

Mr. Buckston Browne * has drawn attention to a source of difficulty in detecting stones when lodged in what he describes as a post-prostatic or trigonal pouch. In such cases he suggests not merely searching with the beak of the sound in the reversed position as it lies in the bladder, but

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* *Lancet*, April 18, 1891.

with an instrument constructed, so far as the beak is concerned, like a flat-bladed lithotrite. The object of the latter is more readily to enter the slit-like opening of the pouch it is desired to explore. Under such circumstances I have found the distension of the rectum with a rubber bag of service in bringing pouched calculi within reach of the sound as well as of the lithotrite and evacuator catheter.*

As an example of the difficulties arising from the presence of diverticula, or recesses within the bladder, in which a stone or a fragment may be concealed, I will now refer to a case shown by Mr. Hakes at the Medical Society during the session 1863–64. It is always well to see that there is some correspondence between what the lithotrite seizes and the amount of fragments removed in performing lithotrity.

Case.—The patient was an old man, suffering from stone, for which lithotrity was performed; unfortunately the operation terminated fatally. On making a *post-mortem* examination, a sac, larger than the bladder itself, was found, communicating with the floor of the bladder by an opening admitting the little finger. In it was contained a portion of the calculus, broken by the lithotrite.

Such a condition as this might not only account for a calculus being undetected, but would cause serious difficulties in the performance of lithotrity. Digital examination by the rectum, after the bladder had been emptied with a catheter, would probably afford the best means of detecting this complication, should any suspicion of its existence arise. Examination of the supra-pubic region with the hand ought also not be omitted. I was reminded of the importance of this on looking through the specimens in the Museum of the City of New York Hospital. Appended to one (784), where there was a sac larger than a hen's egg opening into the bladder near the fundus, in which were several calculi, is the note: "These calculi could not be detected by the sound during life, but the pouch containing them could be felt through the abdominal parietes."

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* *Lancet*, March 14, 1891.

Most of us also, in our experience in the *post-mortem* room, have seen instances where bladders have become so misshapen as to present structural obstacles to the contact of a sound with certain parts of their interior where a stone may be lodged. A structural difficulty in the detection of a stone in the bladder has been illustrated by Mr. Bickersteth,* in a specimen I examined (Fig. 88).

There are probably no urinary cases presenting greater difficulties, both in diagnosing and treating, than those of rugous or sacculated bladders, where phosphatic concretions are deposited on elevated and circumscribed portions of the mucous membrane. By the sound, something closely resembling a stone may be felt, but the absence of a distinct "ring," as the instrument comes in contact with the suspicious spot, as well as its fixity in position—unalterable by the use of the instrument, by changes in the posture of the patient, and by distension of the bladder with water—render

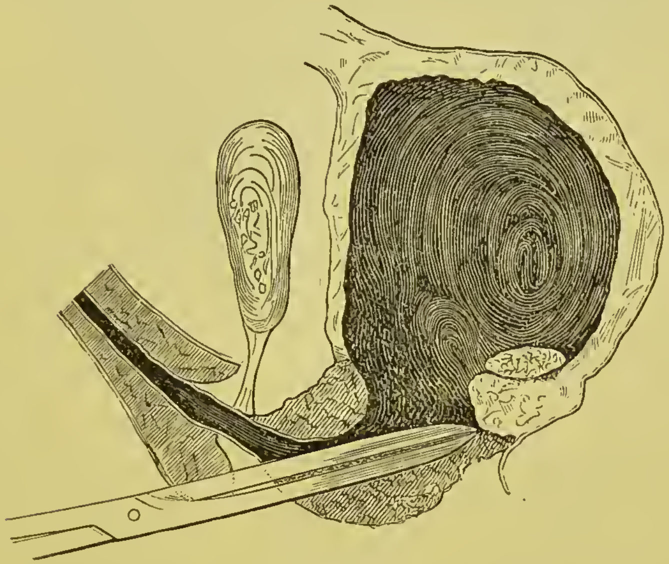

Fig. 88.

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* *Liverpool Medical and Surgical Reports*, 1867, vol. i., p. 134.

the diagnosis tolerably easy. I have frequently remarked, in examining the bladders of persons who have died with greatly enlarged prostates, or with saccules or bars across them, how impossible it would have been, if the cases had been complicated with stone, to detect it with the ordinary sound, provided the stone occupied a position which could be indicated. These are the instances where symptoms are almost sure to arise simulating stone, and necessitating an exploration to determine this point.

In the last place, the stone may be so constituted as in itself to oppose a difficulty in detecting it by the means usually employed.

Case.—In 1863, a boy was admitted into the Liverpool Royal Infirmary, under the late Mr. Long, suffering from prolapsus ani, purulent urine, and painful and frequent micturition. He was sounded, but without any evidence of stone being afforded. Death occurred in a few days. On making a *post-mortem* examination, the kidneys were found disorganised. The bladder was small, and contained a calculus, made up of a urate of ammonia nucleus the size of a damson stone, surrounded by a thick layer of soft material consisting of mucus, fibrin, and a little gritty, phosphatic matter. The outer covering could be cut or torn easily; and after it had been in spirit it presented, on section, a laminated appearance, like the fibrinous layers of an aneurism. On striking the mass with a metal instrument, no ring was produced; hence the impossibility of determining its existence with the sound during life. The specimen was shown at the Medical Society by Dr. Rawdon, and is now in the Museum of the Medical Faculty. In the accompanying sketch the nucleus of the stone and a section of the fibrinous laminæ are seen (Fig. 89).

Mr. Bickersteth* records a similar instance.

Case.—"It was that of a boy, who had every symptom of a stone, but in whom repeated examinations gave no clear indication of its presence. When the sound was introduced, I could feel, with my finger in the rectum, some apparent thickening in the posterior part of the bladder. I operated, and extracted a mass precisely similar to that just mentioned (Mr. Long's case), and the child recovered."

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* "Observations on Lithotomy," *Liverpool Medical and Surgical Reports*, vol. i., 1867. This form of calculus (fibrinous) appears to have been first described by Dr. T. Hodgkin, *Guy's Hospital Reports*, vol. ii., 1837.

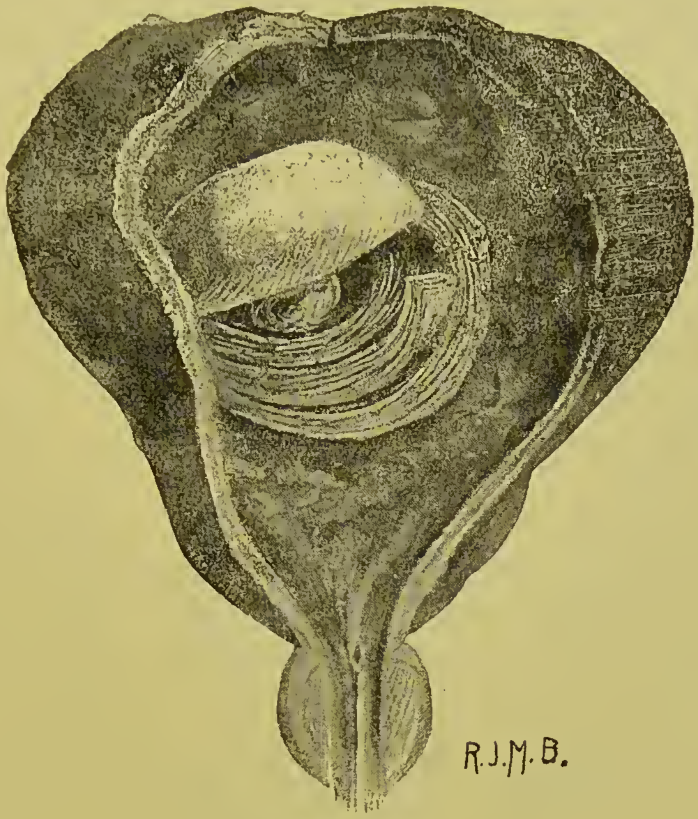

Fig. 89.

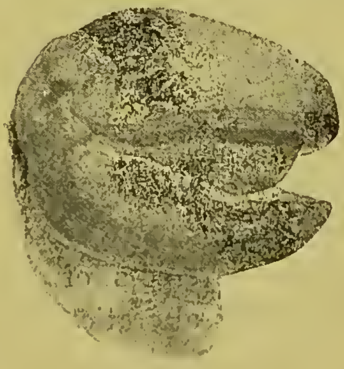

Fig. 90.

The appearance presented by this stone is shown in the drawing (Fig. 90), to which the following description is appended: "Soft urinary calculus removed by Mr. Bickersteth from a boy; the soft external coat is shown cut open, exposing a hard urate of ammonia calculus in the interior." In the absence of what is regarded as the only positive sign of the existence of stone in the bladder—namely, its detection by the sound—reliance must be placed on other symptoms; of these, in children (amongst whom only, so far as I know, soft calculi have been found), prolapse of the rectum, together with signs of urinary irritation, would, in the absence of other explanation, justify an exploratory operation. Before doing so it would, however, be as well to introduce a small lithotrite, and feel if there was anything which, though not capable of being detected with a sound, might afford an obstacle to the closure of the instrument. In this way I have, on more than one occasion, detected stones which were not recognisable by the sound.

Where the stone cannot be readily reached with the sound, means may be taken to bring the stone in contact with the sound. This may be done by a plan which Dr. Freyer* suggests: "A most careful search was made by means of sounds of various kinds, but no calculus could be detected till the aspirator was employed, when a distinct click was felt during the exhaustion of the water from the bladder, and due to the calculus being carried with force against the eye of the cannula by the outward stream. The sound of the fragments clicking against the eye of the cannula during the evacuation of the fragments of a calculus, in the operation of litholapaxy, suggested this mode of diagnosis, and I am now in the habit of having recourse to it when the symptoms of stone are well marked, and the sound fails to detect the presence of one in the bladder."

In reference to the movement of stones, either by the sound, lithotrite, or forceps, we must not entirely forget those extremely rare instances where the calculus has in the gradual process of time perforated the bladder wall, and where its alteration in position or withdrawal might be the means of establishing a communication between the bladder and the peritonæal cavity through which urine could escape. Drs. Mackinder and Farrar* record a case of this kind (Fig. 91) in a man 81 years of age, suffering from stricture and enlarged prostate, for which supra-pubic puncture was performed. The autopsy revealed what is shown in the figure. Commenting upon this case, it is observed: "What would have been the result of lithotomy or of lithotrity in this case, supposing we could have reached the bladder with our instruments and removed the stone? Certainly immediate escape of urine into the peritonæal cavity and the speedy death of the patient. And though the surgeon would have been blameless, it is not impossible that the uncharitable might have referred the cause of death to the unskilfulness or incompetence of the operator."

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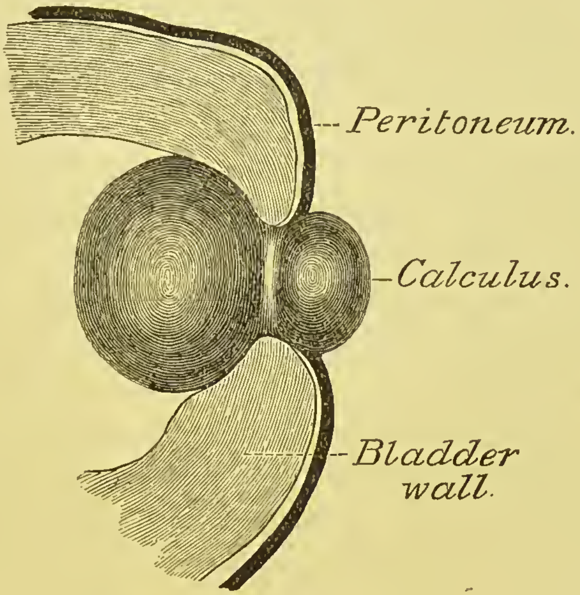
* *The Modern Treatment of Stone in the Bladder by Litholapaxy*, 1886.



(Fig. 91.)

Dr. Cowper † records a somewhat similar instance, where perforation was effected by a phosphatic stone, the nucleus of which was a hair-pin. I met with a case recently where I believe there must have been a perforation of this kind. Peritonitis set in after a lithotrity I performed, where everything passed off entirely to my satisfaction, though the stones were evidently sacculated. The patient died eight days after the operation, and I regretted afterwards, when the symptoms of peritonitis, gradually increasing in severity, developed, that I did not proceed with a laparotomy. I feel sure that no damage was inflicted by the operation, and believe that peritonitis was induced in this manner. The water in the wash-bottles from first to last was hardly tinged with blood. I had never previously met with an instance of peritonitis after lithotrity in my practice. I saw this patient with Dr. Dunbar. It should be remembered, as with all surgical procedures, however slight, that the general condition of a patient may render even sounding inexpedient at the moment. I once attended in consultation for the purpose of sounding and clearing up a case of suspected stone where we noticed at the time that the patient had a slight erythematous-looking blush about a trifling abrasion caused by the razor on the chin. Sounding was consequently postponed; fatal erysipelas supervened. Had the sound or any instrument whatever been used, death would certainly have been attributed to it, as the patient happened to occupy a high social as well as political position.

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* *British Medical Journal*, April 2, 1892.

† *Ibid.*, July 2, 1892.

TWENTY-NINTH LECTURE.

Lithotrity or Litholapaxy.

I will consider the treatment of stone in the bladder, and as lithotrity, litholapaxy, or the crushing operation, as now practised, is the one more generally adopted and the safest, it will be given first place. If stones were detected when small, there is no doubt that this method of disposing of them would not only supplant all other mechanical ones, but be practised with as little risk as attends any minor, though delicate, operation. It is because a calculus is permitted to attain considerable dimensions that an element of danger is imported into the question of its removal—an element which may be approximately stated as proportionate to the size of the stone. Hence the importance surgeons attach to the early detection of these concretions.

It is not necessary at the present day, in a practical treatise, to occupy time by recording the steps by which lithotrity has reached its present position, or the fluctuations it has undergone within this century. It would, however, be impossible to proceed without noticing the impulse given to Civiale's proposals by the demonstrations of Otis and Bigelow, of America, at a time when the prospects of lithotrity were beginning to wane. It is to the former we are indebted for supplying us with a proper estimate of the capabilities of the male urethra as to its size and its power of adaptation to larger instruments than were formerly used; whilst to the latter it was reserved to show that the bladder is more tolerant of prolonged manipulations than is supposed, provided that, in the case of lithotrity, all fragments of stone are removed from it without unnecessary delay.

In 1878, shortly after an article by the late Professor Bigelow, of Boston, "On Lithotrity by a Single Operation"[*] appeared, I was present at the Massachusetts General Hospital, and saw him remove a large lithic acid stone from the bladder of a man by a proceeding which was different from anything I had previously seen or read of. The chief points of distinction seemed to be the recognition as a principle of the possibility and propriety of removing the entire stone from the bladder at one operation, and the employment of an evacuating apparatus adequate to the purpose. In one hour and nineteen minutes, under ether, a large lithic acid calculus was reduced to fragments, and entirely removed from the bladder, and on the fourth day the patient was convalescent. At that date I understood this operation had been practised fourteen times—including a case each by Dr. J. C. Warren and the late Dr. Curtis, of Boston—with but one death. I was much indebted to Dr. Bigelow, not only for the explanation he gave of his method of operating, but also for permitting me to take part in the various manipulations. In the same year I reported to the British Medical Association, at Bath,[†] what I had seen, and exhibited, I believe for the first time in England, Dr. Bigelow's apparatus. Shortly afterwards I performed the new operation, and have continued to do so. In the removal of some large stones the time taken up has been considerable. In a successful case reported by Professor Cheever,[‡] of Boston, the operation lasted three hours under ether, the stone being composed of oxalate of lime. In a patient where I removed with safety a stone weighing upwards of two ounces the operation lasted over two hours. Dr. Keegan * reports a case where the process occupied four hours, the patient being well enough to return home six days afterwards. Reference is made to such exceptional cases as these merely to show that there need hardly be any time limit, so long as the manipulations are carefully conducted. It will be convenient to discuss the question relating to the selection of an operation in a given case after the various details have been described, and I will therefore offer some remarks on the instruments employed and their use.

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[*] *American Quarterly Journal of the Medical Sciences*, January, 1878.

[†] *British Medical Journal*, vol. ii., 1878.

[‡] *Boston Medical and Surgical Journal*, March 23, 1882.

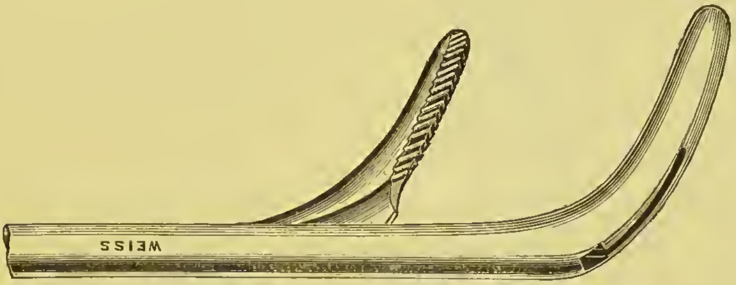

Fig. 92.

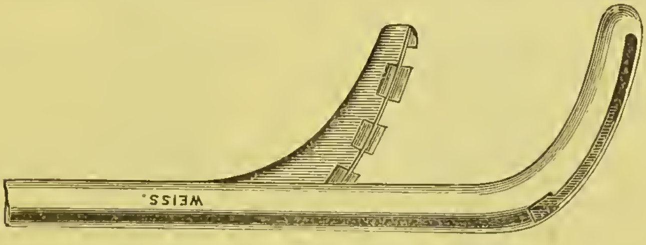

Fig. 93.

Lithotrites are required of different sizes and strength, proportionate not only to individuals of almost all ages, but to stones of various dimensions and composition. These instruments are of two kinds, smooth-bladed (Fig. 92) and fenestrated (Fig. 93), the former being adapted to the lighter kinds of work, and the latter to the largest and hardest specimens of stone which come within the range of lithotrity. The modern instrument is constructed to permit of the

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* *Lancet*, vol. ii., 1886.

male blade sliding within the female, so as to enable the surgeon to seize the stone or fragment, as the case may be. This is accomplished by means of a button on the handle, and without moving the position of his hands the operator can fix the stone within the grasp of the instrument, and at the same time bring into play the mechanism necessary for the screw or breaking movement. There are various contrivances for accomplishing the latter object. In many of the French instruments the change from the slide to the screw is effected by a catch which can be elevated or depressed as required by the alternate movement of the thumb. I think the former method is generally preferable. In bringing the screw action on the stone into play, a wheel is usually provided (Fig. 94), which is grasped between the index finger and the thumb.

The more powerful lithotrites of Bigelow are fitted with a ball-handle (Fig. 95), and rotation is thus effected, though I prefer the wheel movement. With the former, I have no doubt greater power can be obtained, but at the sacrifice of some delicacy in manipulation. Knowing what the fenestrated instrument with the wheel is capable of accomplishing, I question, in the case of a stone requiring greater force than this, whether, with possibly some exceptions, we are prudent in selecting lithotrity under such circumstances unless provided with considerable practical experience. Lithotrites are made of the following sizes:—

FOR CHILDREN.				FOR ADULTS.			
5	in stem,	5	in bend of blades.	9	in stem,	12	in bend of blades.
6	do.	6	do.	10	do.	14	do.
7	do.	8	do.	12	do.	18	do.
8	do.	10	do.				

We cannot be too careful in the selection of these instruments, when we consider the strain that is put upon them and the damage that might be occasioned by their bending or breaking. The best material and workmanship should be required. Upon this point Dr. Keegan* remarks: "I would warn the inexperienced against the fatal economy of buying cheap, and therefore badly made and untrustworthy, litho-

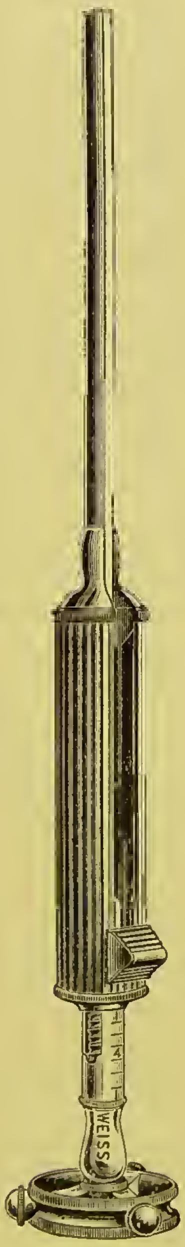

Fig. 94.

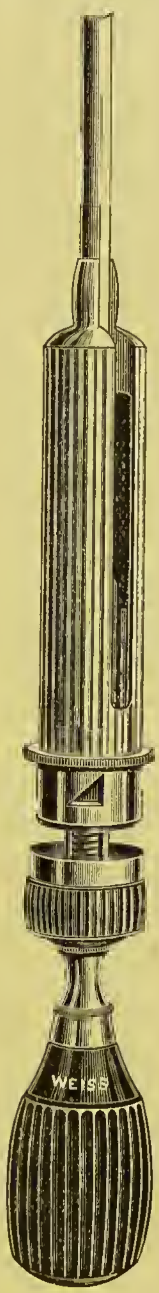

Fig. 95.

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* *Indian Medical Gazette*, July, 1892.

trites. There are plenty of such instruments in the market, and they may prove, even in skilled hands, most dangerous weapons of destruction."

Care should also be taken by the operator in seeing that all the movements of the lithotrite are without hitch or friction, so that nothing may intervene between his sensation of touch and the stone. The smaller the calculus or fragment the greater is the necessity for this accuracy in adjustment. Further, it must be ascertained that the outer blade well protects the inner one, especially where the stone is seized and the two parts of the instrument are made to approximate. These are points amongst others which the surgeon should himself attend to and test in selecting his lithotrites. It is well for the operator to be provided both with fenestrated and smooth-bladed instruments, as the latter are very useful, especially in the case of soft stones or small fragments. All lithotrites are liable to become impacted with *débris*; generally speaking, by reversing the screw action and giving the instrument, whilst firmly held, one or two sharp taps with a concusser of some kind, the hitch is overcome. It is seldom that the impaction is of such a nature as to render the closure of the blades impossible. Mr. Cadge has informed me that such an occurrence once happened in his practice. In using a lithotrite for measuring a stone in a male child, with the view of ascertaining whether it could be crushed, on seizing the calculus and lightly closing the blades upon it, he found to his astonishment that the instrument, though one of the best of its kind, was absolutely locked. He could neither close nor open it, and no force he could safely apply being of any avail, he performed a supra-pubic cystotomy on the end of the lithotrite, and by protruding it was able with his finger to clear the instrument from the *débris* which had impacted it, the patient making a good recovery.

The stone having been broken into fragments by one or more introductions of the lithotrite, the *débris* is removed by means of a large-eyed catheter and a syringe or aspirator filled with water. The catheters for this purpose are of two kinds, straight and curved (Figs. 96 and 97). The largest I employ corresponds with No. 26 of the French gauge, and from this size they gradually diminish until we come to those appropriate for children. The eyes of my evacuators (Fig. 98) are rather larger than those in general use. It is very necessary that all these instruments should be provided with a stylet (Fig. 99), so that they may not become impacted with

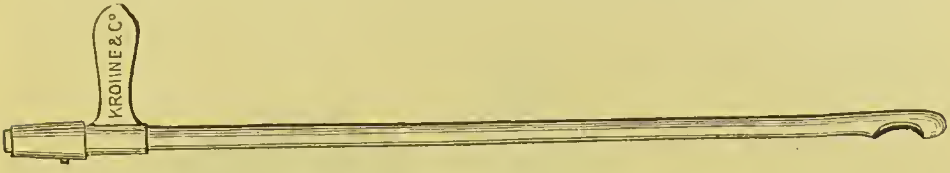

Fig. 96.

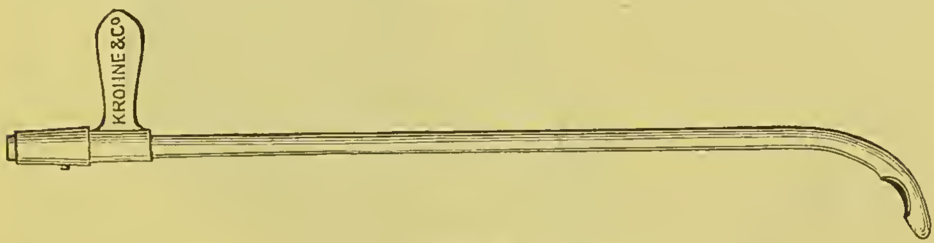

Fig. 97.

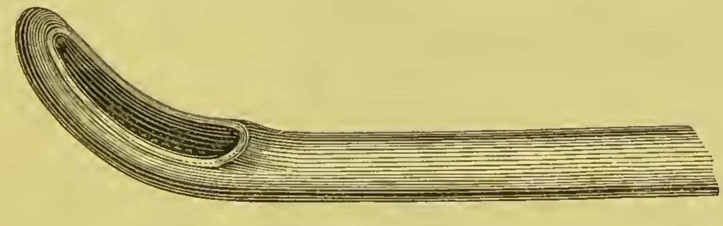

Fig. 98.

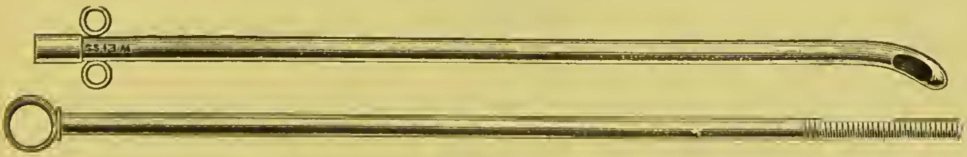

Fig. 99.

fragments. If an evacuating catheter is withdrawn with a sharp fragment retained in the eye the urethra may be wounded and much damage done. If there is the slightest resistance on attempting to withdraw the instrument the stylet should be at once passed. Bigelow preferred a straight evacuator (Fig. 96). They are almost as easily introduced as curved ones, but the latter are generally used.

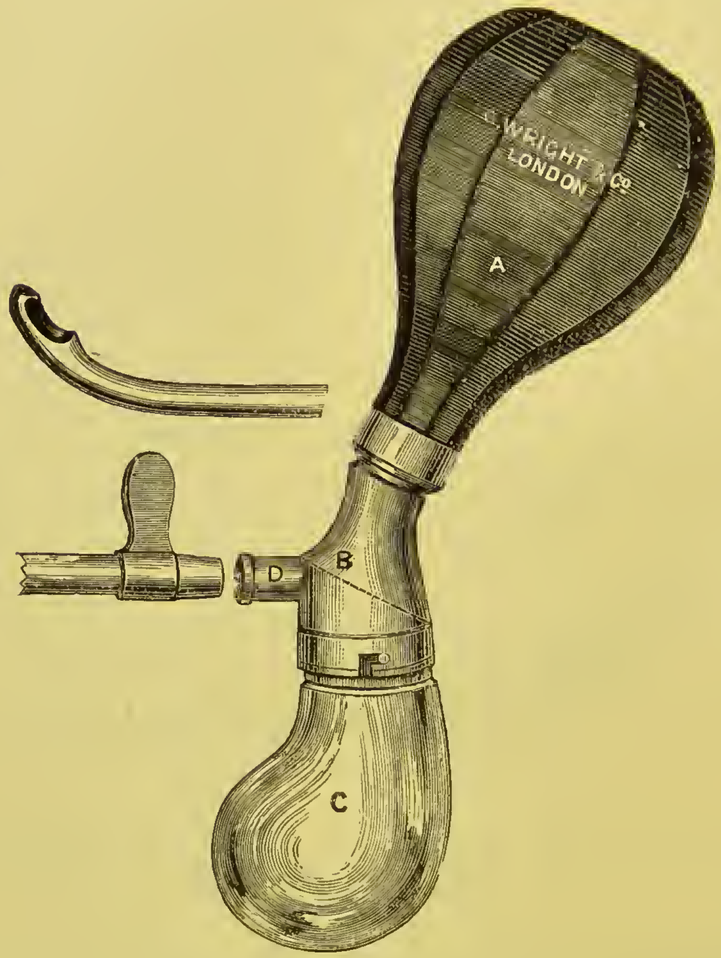

Fig. 100.

For withdrawing the fragments from the bladder rubber aspirators are commonly employed. There are two convenient varieties, which are here figured (Figs. 100 and 101).

Bigelow's original instruments and the mode of using them are shown (Figs. 102 and 103). Morgan's instrument* (Fig. 100) is the one I generally select. It has a decided advantage in enabling the operator to work it by grasping the top of the instrument. I have had the junction between the rubber bag and the metal containing the trap connected by means of a bayonet joint instead of by a screw, as in the original instrument, which facilitates the process of filling

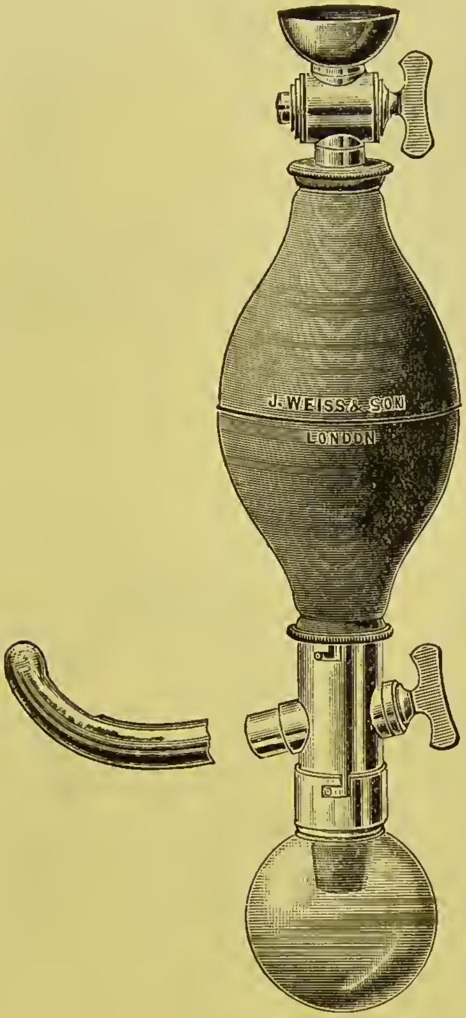

Fig. 101.

* *Lancet*, Sept. 2, 1888.

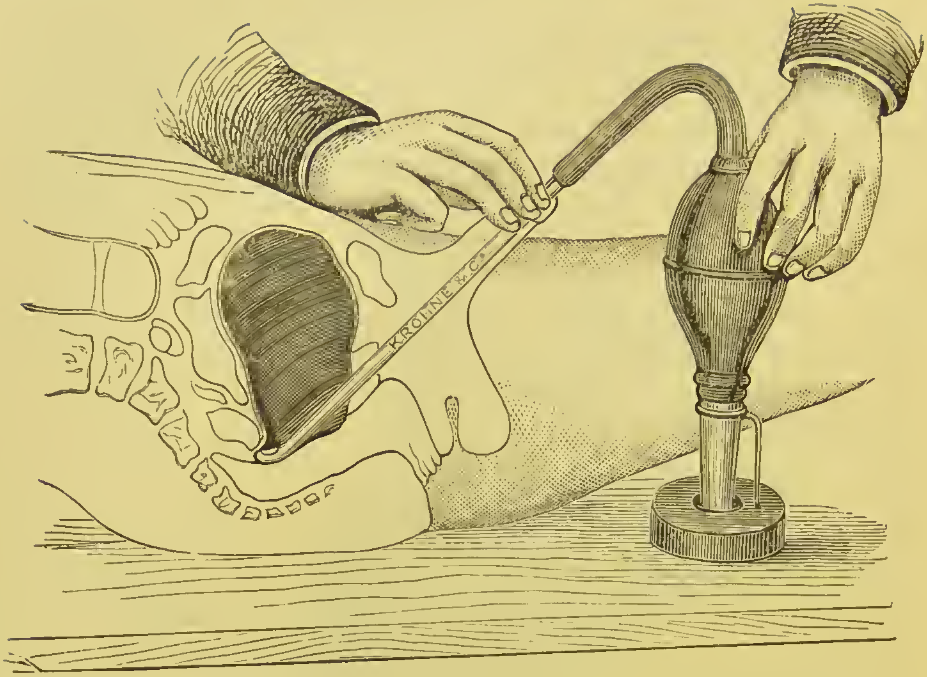

Fig. 102.

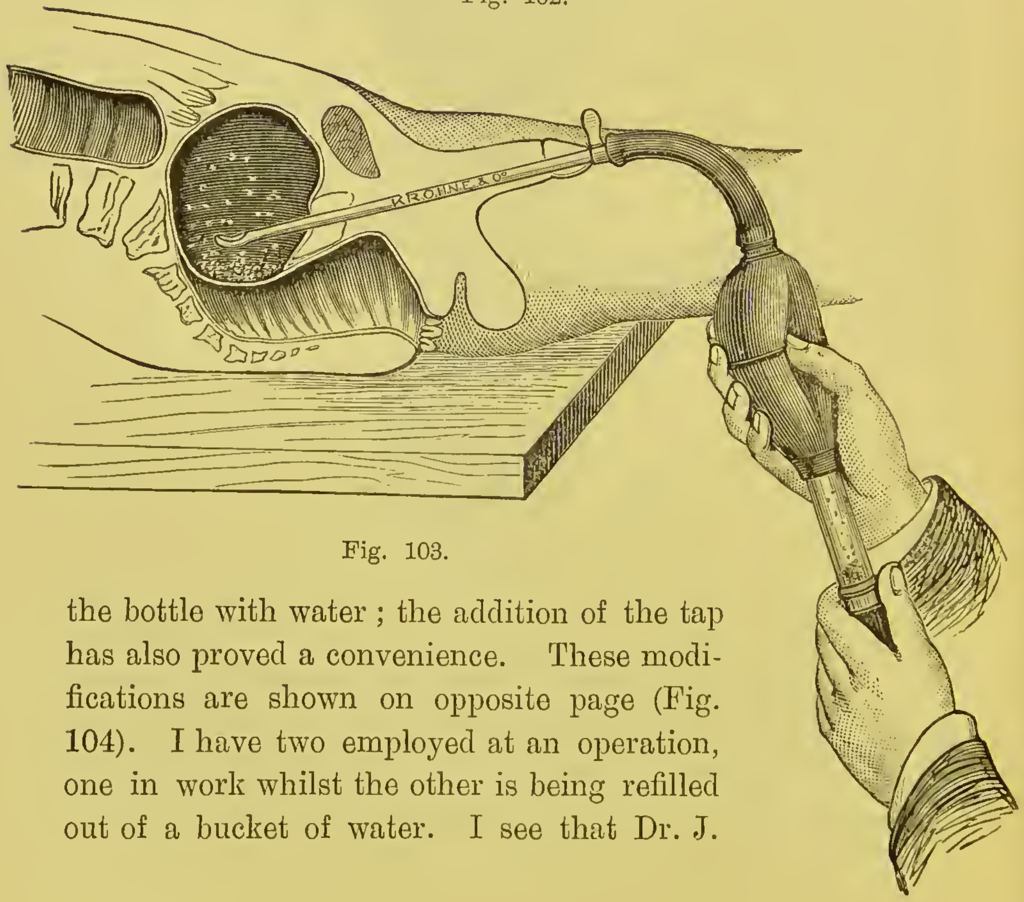

Fig. 103.

the bottle with water ; the addition of the tap has also proved a convenience. These modifications are shown on opposite page (Fig. 104). I have two employed at an operation, one in work whilst the other is being refilled out of a bucket of water. I see that Dr. J.

Somerville* describes an evacuator where he has dispensed with rubber as being liable to deteriorate in hot climates. I have not had an opportunity of testing it.

All the evacuators I have tried are open to the objection that occasionally fragments will be washed back again in spite of the trap, thus necessitating a second withdrawal. In view of this inconvenience and cause for delay, Dr. F. N. Otis† has described an evacuator which he believes meets this objection (Fig. 105). It is a good instrument, but I cannot quite satisfy myself that it is entirely free, unless very carefully watched, from this contingency. The possi-

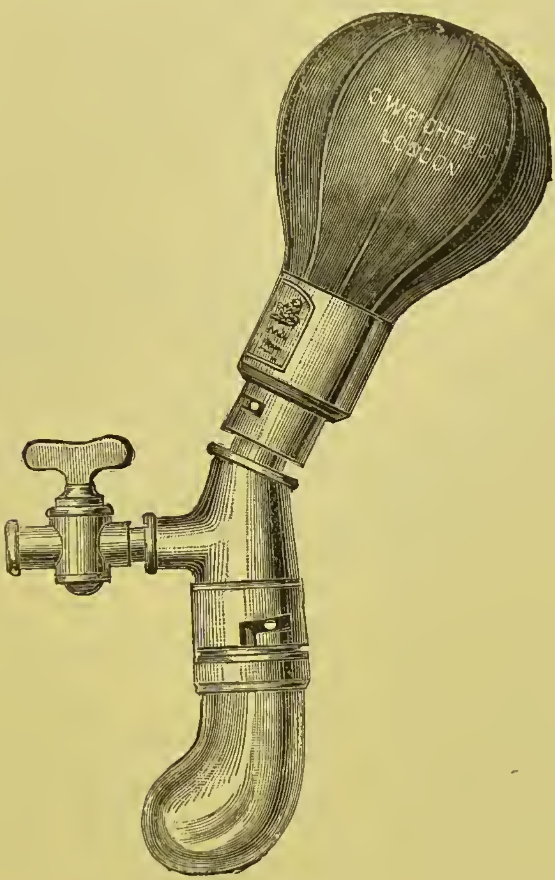

Fig. 104.

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* *British Medical Journal*, Aug. 27, 1892.

† *New York Medical Herald*, Nov. 3, 1883.

bility of washing back fragments by the method of aspiration, as just referred to, seems to have led Guyon and others to alter materially their method of procedure in crushing and evacuating stones. This consists, as I have elsewhere described,* in triturating the stone so finely by the lithotrite as to enable the powdered particles to run out through a large-eyed catheter by frequently filling the bladder with water by an ordinary syringe. This practice, I have found, has much to commend it. It is to be remembered that as all these aspirators consist largely of rubber, care is required that they are kept thoroughly clean and aseptic; in fact, the same precautions should be taken in regard to them as with catheters.

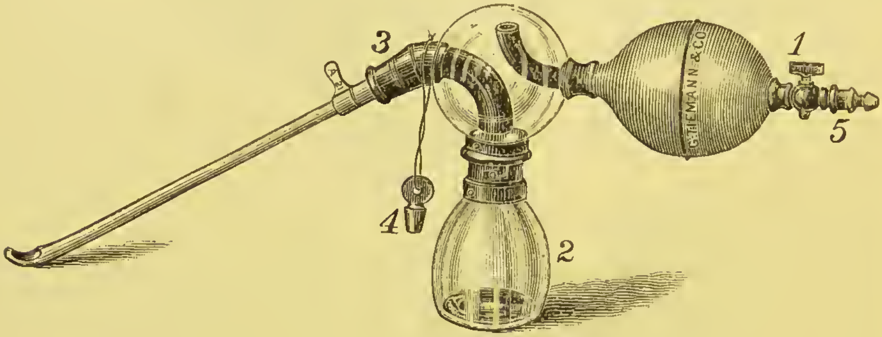

Fig. 105.

Having thus referred to some of the instruments employed in lithotrity, I will now proceed to speak of their use, which will best be done by taking an ideal case, where, for instance, an adult male, otherwise healthy, with a normal bladder, is suffering, we will say, from a lithic acid calculus of moderate size. The stone having been discovered and lithotrity decided upon, there are a few preliminaries which may be noticed. In the first place, due regard should be paid to those points which we recognise as of importance in connection with all patients who are about to undergo an operation confining them for some days. Rest to the parts involved and regulation of the diet and the bowels are attentions which will not be disregarded as being conducive to well-doing.

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* *Lancet*, July 2, 1892.

At the time of operation care should be taken that the patient is well protected against exposure, and I generally see that the legs and thighs are encased in loose flannel leggings, which can be readily slipped on, and are also a protection against wet. By this means the genitals are the only parts exposed. The patient should be placed on a suitable operating table, or its equivalent, care being taken that its height is proportionate to that of the operator. I seldom use chloroform, my preference being either for the combination of nitrous oxide gas with ether, or what is known as the A.C.E. mixture, the latter consisting of one part of alcohol, two of chloroform, and three of ether. I have never had cause to regret these selections. Cocaine is not to be relied upon as being efficient so far as lithotrity is concerned, though it suffices for such temporary purposes as the passing of an instrument along the urethra. The patient being anæsthetised by a competent administrator, he should first be placed with the pelvis slightly raised on a pillow, a position which may be altered according to circumstances. Reliquet * employs a special apparatus (Fig. 106), which I have also seen

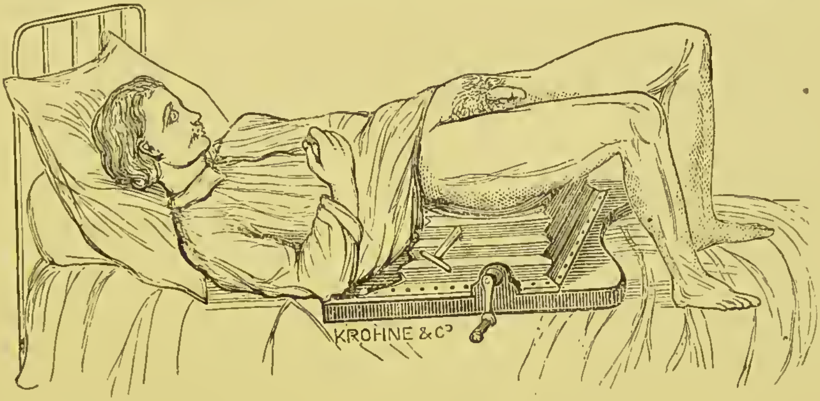

Fig. 106.

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* *De la Lithotritie Rapide*, Paris, 1882.

Gouley use for this purpose. I have hitherto found one or two pillows answer this purpose. Before using any other instrument, I usually commence by washing out the bladder with boracic lotion by means of the aspirator catheter and wash-bottle. This fulfils three objects: it secures (1) the operator manipulating in a clean and not a foul bladder, (2) it permits any small stones to be withdrawn without being broken, and (3) it allows of sufficient fluid being left behind to facilitate the movement of the lithotrite in searching and crushing, and thus affords a protection to the mucous membrane.

In commencing to crush and evacuate, the operator should endeavour, as far as possible, to render the proceeding a bloodless one, by causing neither damage in the introduction of instruments along the urethra, nor in his efforts to seize and crush the stone. It is often possible to conduct an operation of this kind, even of some duration, with but little discolouration of the water in the aspirator. This is difficult to accomplish when the prostate happens to be large and obstructive. Any extensive damage of this kind proves a serious obstacle to the success of lithotrity, and when unavoidable, is a sufficient reason for the immediate substitution of some form of lithotomy. Much time may often be saved in performing lithotrity, not by any sacrifice of safety to speed, but by previously seeing that the nurses are well versed in clearing the lithotrites when not in use, filling the wash-bottles (without air), and in recognising and handing the exact sized evacuating tube the operator is using. Where I have had to operate with excellent nurses by me, but unused, by reason of want of practice, to this kind of work, a quarter of an hour, or even more, has easily been lost, and anæsthesia unnecessarily prolonged. This is the only kind of economy of time that can be justified.

Stones of an elliptical or ovoid shape more commonly lie with their long diameter in a direction corresponding with the line of the urethra, and are generally first seized in this axis by the lithotrite. Hence calculi may appear larger than they really are. My attention was first directed to this point by my friend Dr. Freyer, whose opportunities of judging in reference to all matters connected with stone have been so extensive in India. Naturally our object is to seize the stone in its shortest diameter, if we are going to crush it, as simplifying the operation and throwing less strain on the lithotrite. Consequently this may necessitate a change in the first position of the lithotrite relative to the stone for which, in addition to other reasons, some fluid in the bladder is required. In lithotomy, on the other hand, this rather constant position of oblong stones relative to the outlet from the bladder is favourable to their more speedy withdrawal.

The bladder having been cleansed and the lithotrite introduced, the surgeon taking his place on the patient's right-hand side, the stone is carefully sought for. This may render it necessary to reverse the position of the instrument so as to enable the operator to feel for and pick up anything which may be lying behind the prostate in the most dependent portion of the bladder. The stone having been seized and the screw power adjusted, the lithotrite should be slightly and gently rotated with the left hand, so as to see that it is quite free from the coats or rugæ of the bladder. I consider this the most important movement in connection with the process of lithotrity. It may be almost imperceptible to the casual observer by reason of its delicacy, but it should on no account be omitted. Its full recognition makes all the difference between an almost bloodless operation and otherwise; and further, it is the means of preventing much cicatricial tissue being introduced within the bladder wall. Probably there is no operation where more fineness in manipulation and patience is required than in lithotrity, as it is entirely dependent for its success upon that kind of touch which is unaided by sight. A rough cicatrix within the bladder may not only act as a foreign body, but prove the nucleus upon which a phosphatic stone may concrete An illustration of this I recently saw in a case with the late Dr. Horteloup, at the Necker Hospital, where the bladder was explored by a perinæal cystotomy, and a linear deposit discovered on the uneven cicatrix of a previous supra-pubic opening. When operating in a bladder of fairly normal shape, with reasonable care, there is little risk of doing damage to the mucous membrane; where, however, the prostate is enlarged and the surface of the bladder rendered irregular by trabeculæ, elevations of its surface, and depressions in which residual urine has been lodging, the difficulties arising are not inconsiderable. The operator should be careful in ascertaining that the stone or fragments when seized by the lithotrite are perfectly free, and though within the grasp of the instrument, an elevated portion of the wall is not also included. In Fig. 107 it will be seen that, though the female blade is in direct contact with the stone,

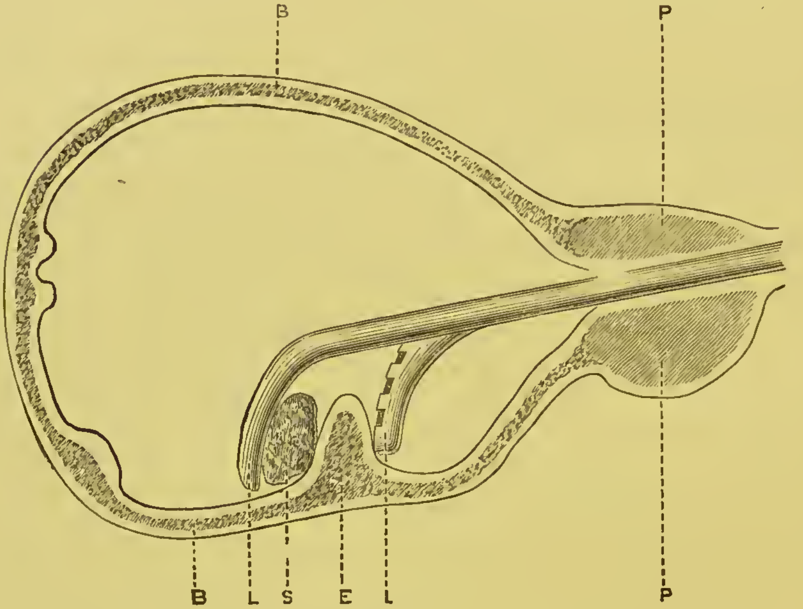

Fig. 107.
B, bladder; P, prostate; E, bar; L, lithotrite; S, stone.

the male blade is really in a pouch behind the enlarged prostate. This is a very deceptive position, as the operator feels that he has the fragment within the grasp of his instrument. The slight rotary movement of the lithotrite by the left hand of the operator, to which reference has been made, will invariably be found sufficient to detect this false position before the instrument is screwed up and serious damage done.

As a rule the operator should continue to use the lithotrite so long as he can pick up fragments readily. When this ceases, or he feels that his movements are embarrassed by the presence of too much *débris*, the aspirator should be substituted, filled with plain water or boracic lotion. In using the lithotrite and seizing very large fragments, as in the earlier introductions, when the stone is hard, it is a good plan to screw it up until the resistance afforded by the calculus is felt to be considerable. If the operator will then wait for a moment or so, he will often find the stone yield without further force; in this way we may avoid putting on the maximum amount of strain on the instrument. This is a matter of some importance in grasping hard stones of, say, nearly two inches diameter. Then again, in picking up stones or fragments in bladders which are more or less pouched behind the prostate, it is convenient to alter the position of the calculus relative to the bladder before pulverising. I sometimes say, "If you take a stone out of a hole or depression, put it on the bank to break, and then you may the more easily deal with the remaining portions of it." I have often demonstrated how readily this can be done, and how it simplifies an otherwise difficult manipulation.

It is always well to have one or more aspirator bottles in use so as to avoid delay arising out of filling them. In manipulating the aspirator, I do not use the stand, as seen in Figs. 102 and 103, as fragments are withdrawn in greater numbers by making slight alterations—elevations, depressions, and rotations—in the position of the evacuating tube. In selecting evacuating tubes, the object should be to use the largest the urethra will receive, provided it can be moved about easily. In some persons the meatus is so contracted that it is necessary to incise it before a sufficiently large tube will pass. Referring to the size of the evacuating catheters, Dr. Bigelow remarks: "31 is very rarely needed, and the French sizes, 28 and 29, are generally the most convenient. For a final washing or sounding without anæsthesia, when it is desirable to give the patient the least discomfort, even so small a calibre as 26 is sometimes useful." * A too tightly fitting catheter may damage the deeper portion of the urethra, which is less tolerant of injury than the bladder.

I have not found a small quantity of air obstruct the manipulations, for the reason that it and the stone fragments occupy opposite quarters in the bladder. If enough air enter the bladder to interfere with the withdrawal of the fragments, or to provoke spasm, it is easily displaced by disconnecting the evacuating tube from the aspirator, and making pressure with the hand over the pubes. In reference to the presence of air in the bladder, the following incident may be worthy of record:—

When in Philadelphia in 1881, Dr. Brinton called my attention to a case where a patient had made an apparatus for washing out his bladder, which he demonstrated on his own person. The apparatus consisted of a catheter with a large eye, the glass shade of a lamp, and the rubber of a breast pump. The patient insisted that, by first introducing some air into his bladder, the process of washing out was facilitated and made easier. He was under the impression that he was suffering from stone, but none could be found.

When using either the lithotrite or the aspirator, the bladder, even when the patient is deeply etherised, some-

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* *Lancet*, Jan. 6, 1893.

times exercises a violent expulsive effort. Until this is over, all manipulations should be suspended, otherwise an accident may possibly happen. "Even deep anæsthesia," as Billroth observes, "is not always sufficient to obviate spasmodic action of the bladder." * When manipulating with a considerable quantity of water in the bladder, if spasm comes on, all tension should be taken off by allowing an escape to take place—a sort of safety-valve action. These are some of the points in connection with breaking the stone with the lithotrite and removing it with the aspirator. The best test for the last fragment is the suction power of the aspirator bottle, as the piece is almost sure to be felt impinging against the eye of the catheter, claiming permission to escape in a reduced form. At the conclusion of an operation the bladder should be washed out with warm water until it returns free from discolouration with blood. After lithotrity care must be taken that the urine is not retained beyond a reasonable time, and, if this should be the case, a catheter must be passed. Hence it is a good plan, when the stone has been removed and before the patient has become conscious, to ascertain what catheter passes most easily, which will probably be a soft one. Thus all further trouble in the selection of an instrument, should one be required, is avoided. Some surgeons leave a rubber catheter in the bladder for forty-eight hours after a lithotrity, allowing the urine to drain away continuously into a bottle in the patient's bed. If the operation has been a prolonged one and the urethra is probably sore, or if the patient is more or less dependent upon the catheter, this is not a bad plan, as it also allows of the bladder being washed out with some antiseptic lotion without disturbing the patient. In ordinary circumstances, when the operation has been simple and the bladder and prostate are tolerably normal, I have not found this expedient necessary. When the operation has been a long

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* *Clinical Surgery*, Sydenham Society's Translation, 1881, p. 273.

one and the bladder is irritable, it is well to introduce a suppository containing a grain or so of opium into the rectum before the patient is returned to his bed.

Reference will presently be made to some accidents which have occurred in the course of a lithotrity. It may, however, be well to say here that it is a good rule never to undertake lithotrity without having lithotomy appliances at hand. Unforeseen events connected with the stone, the bladder, the urethra, or the instruments, have rendered the lithotomy operation unexpectedly necessary, and by recourse to it a fatal termination has been averted. In two of my own cases, within a recent period, I know this result would probably have supervened if I had not been able to adopt the alternative without delay. In one of those instances the immediate change from lithotrity to median lithotomy was necessary by reason of a large triangular fragment becoming suddenly forced by the spasm of a powerful bladder into the membranous urethra. By the latter operation, with the aid of crushing forceps, all the stone was removed as well as the impacted fragment, and the patient made a speedy recovery. In the second instance, in performing lithotrity for an elderly man, the size of the stone felt and crushed was so out of proportion to the duration and character of the bladder symptoms, that I was sure other stones were concealed somewhere beyond the reach of the lithotrite. I therefore performed a median cystotomy, which enabled me to feel a distinct cavity, resembling what is seen in Fig. 110, immediately above the prostate communicating with a sac, out of which, with a pair of long forceps, I removed thirty-four fasciculated lithate stones, weighing altogether nearly an ounce and a half. Much assistance in seizing the stones was rendered by Mr. Braine exercising pressure above on the abdomen. The patient, though advanced in age, made a good recovery. A drainage-tube was used.

Accidents occurring in the course of a lithotrity are fortunately rare, but some have been recorded which may be briefly reviewed. They may be classified under three headings in connection with (1) the instruments employed; (2) the stone; (3) the soft parts. (1) A good lithotrite may break under a strain beyond its power, but I am not acquainted with an instance of serious bending. The latter mischance would probably be more awkward than the former. The breaking of a portion of the crushing blades would most likely necessitate the immediate resort to a perinæal or supra-pubic cystotomy. Dr. Vander Veer,* of Albany, U.S.A., records an instance in a male adult operated on by Dr. N. L. Snow, in which the stone was large and hard, and the lithotrite broke "about half an inch from the end, leaving the portions of both blades in the bladder." Lateral lithotomy was performed, and the fragments of stone and portions of instrument were removed. The patient died on the fifth day after the operation, which is stated to have occupied an hour and a half. I have no information connected with any important bending of a lithotrite. The impaction of a lithotrite with stone, so as to render the instrument immovable, has been previously illustrated by a case of Mr. Cadge (page 420), where the difficulty was safely overcome by a supra-pubic cystotomy. To have attempted to withdraw the lithotrite along the urethra under such circumstances would certainly have been fatal. The eyes of aspirator catheters may be so firmly filled with stone fragments as to impede their withdrawal. When this is the case the instrument should be cleared by means of a stylet. Hence the importance of always having the latter at hand.

(2) It has happened in the course of a lithotrity that by the spasmodic action of a powerful bladder, a piece of the broken stone has been so firmly jammed into the deep urethra as to render the further stages of the crushing

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* "The Classification of Vesical Calculi," *Transactions of American Surgical Association*, 1887.

operation either impossible or hazardous. When this is the case it is better to perform a median cystotomy, either upon the fragment thus impacted, or upon a small staff which may be passed alongside of it into the bladder, rather than to persevere with efforts to force the fragment back. I have already illustrated this.

Small fragments impacted in the urethra may sometimes be removed by a pair of forceps with crocodile jaws (Fig. 108) or by gently pushing them back into the bladder, where they can be crushed. Incidentally I may mention a case recently seen in which a renal calculus was impacted behind a deep urethral stricture. The stricture was dilated under ether, by the successive introduction of Lister's bulbous metal bougies, up to a No. 12 English size. When the patient recovered from the effects of the ether, he spontaneously passed the boracic solution with which I had filled his bladder with such force as to readily expel the stone. I assume that it must have been lodged there for some little time previously, and so made a depression for itself in the canal, otherwise it would have been pushed back by the introduction of the bougies. Large or irregular fragments, however, cannot with safety be treated in this way.

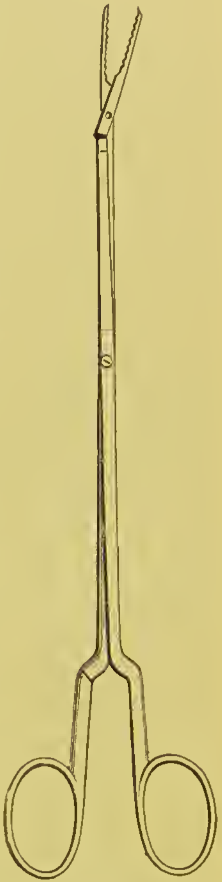

Fig. 108.

(3) In connection with the preliminary stages of lithotrity attention has been drawn to the importance of endeavouring to avoid making a simple operation a difficult one by occasioning any damage to the parts, sometimes abnormal and obstructive, through which the instruments have to pass on their way to the bladder, or in the course of their withdrawal. Any serious damage of this kind would probably

necessitate a recourse to some form of lithotomy, as, if the operation of crushing could be brought to a successful issue under such conditions of difficulty and embarrassment, the prospect of eventual recovery would be considerably reduced by the complications necessarily attendant upon structural lacerations of this kind. Such complications would be likely to be more serious in their results than those usually attending the direct wound—for instance, of a median cystotomy provided with suitable drainage. Instances have been recorded when—from an unnatural thinness of its walls, from spasm, or from an undue amount of force, as for instance in the case of a child—the bladder has been ruptured. If the lesion is known to have occurred on the peritonæal aspect of the viscus, a laparotomy with the object of closing the rent would be indicated; whereas if it were, as in a specimen I once saw at a medical society, in the floor, a lateral lithotomy, by providing a means for immediately producing urinary incontinence, would give a chance of recovery, as I have pointed out on page 354. A lesion occurring under such circumstances is, however, seldom recognised until after death.

In reference to the immediate after-treatment of lithotrity there is not much to be said. A successful operation now leaves little more to be done than what is included under the terms warmth, rest, careful nursing, suitable diet, and a complete discharge of urine at regular intervals. If the operation is followed by some degree of local inflammation, and there is reason to suspect the presence of fragments, their immediate withdrawal is the proper course to take. The possibility of such a contingency as incomplete removal must be recognised in connection with lithotrity, since some part of the bladder may be rendered difficult of access. It should not be forgotten that a stone is a foreign body which, to a certain extent, the bladder has learnt to tolerate; but a broken calculus, combined with the circumstances attending its fracture, is capable of exciting the most urgent signs of its altered shape.

After lithotrity care should be taken to see that the urine shall have returned to a normal condition, both in appearance and composition, before the case is considered as completed. This is more particularly necessary in those instances where, in addition to the stone, the case is further complicated by a large prostate, a pouched or sacculated bladder, or such a state of atony renders the patient more or less dependent on the catheter. The urine should be clear and free from evidence of shreds or masses of lymph, like feathers, since these are capable of providing not only material for decomposition, but for the aggregation upon them of phosphatic particles. A clean bladder and clear urine present conditions under which it is almost impossible for a recurrence of triple-phosphate stone to take place. Until these conditions are secured, attention to the toilet of the bladder may be required as referred to in the Twenty-third Lecture.

Since the introduction of Bigelow's method of operating, the mortality as well as the period of convalesence connected with the operation has undergone considerable reduction. It is not unusual to meet with instances in which recovery may be said to be completed within a week, even when stones of a considerable size and hardness have been removed. Without going into statistics, there is no doubt that the mortality connected with lithotrity is not only very small, but has been much reduced since the adoption of the Bigelow method. If stones were dealt with in this way when as yet small, it would be practically *nil*. Phlebitis after lithotrity is now rarely seen, owing to antiseptic precautions and improved instruments.

I think it will be generally conceded that, for all calculi of a moderate size occurring in otherwise healthy male adults, lithotrity is the treatment which will give the best results with the least risk to life. Where stones are unusually large, or complicated with disease in the urethra, prostate, bladder, or kidneys, it cannot be said that there is a consensus of opinion as to the best method of procedure. When calculus is associated, as is often the case in elderly males, with enlargement of the prostate, unless it is considerable or unusual, lithotrity is not contra-indicated, though if there is much difficulty in finding or handling the stone with the lithotrite, it may be expedient to substitute lithotomy. Under the same condition, an inability to discharge the urine from the bladder spontaneously may be a reason why it is safer to discard lithotrity.

When stone and tumour of the bladder coexist, supra-pubic lithotomy would, as a rule, be indicated in preference to lithotrity, as the former permits of the tumour being explored, and removed, if found practicable, on inspection. In a case of this kind, reported by Dr. Alexander,* where he performed supra-pubic lithotomy, and removed a stone from a cancerous bladder, we have an illustration of what, perhaps, is best to be done under these circumstances.

Suppression of urine after lithotrity is a serious complication, and for the most part happens in patients with unsound kidneys when the operation has been of a prolonged character. For the management of this symptom reference may be made to my remarks in connection with the subject of urethral or urinary fever. As in other disorders, where operative treatment has to be considered, advanced structural kidney disease is alike unfavourable for lithotomy and for lithotrity. It is, however, a question of degree, which often requires fine balancing, and where some previous knowledge of the patient and his constitution is of assistance. Whether under such circumstances to remove the stone by lithotrity or by lithotomy, or not to attempt either, are questions involving grave responsibility, which cannot be answered by rules having general rather than individual application.

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* *Liverpool Med.-Chir. Journal*, July, 1884.

More than one case has come under notice in which I have advised, with regard primarily to the serious state of the kidneys or other vital organ, that the removal of the stone should not be attempted, and have had the satisfaction of believing that the course adopted has been the means of permitting a person to live out his days with not more discomfort than surgery could entirely alleviate.

Stricture of the urethra sometimes complicates stone in the bladder. In one instance which I saw, with Dr. E. Adam of Liverpool, of a middle-aged man, where lithotrity was performed, the result was not satisfactory.

Case.—Seven days after the operation, and when the patient had left the Infirmary, rupture of the urethra, behind the stricture, and extravasation of urine suddenly took place and caused death, in spite of incisions wherever the vitality of the tissues was threatened. Though the operation was simple, and the water in the aspirator hardly tinged with blood, it is possible that the manipulations may have further weakened a urethra which had long been diseased, and so contributed to the fatal result. Before performing lithotrity, I had dilated the urethra, so that the lithotrite passed readily.

In a similar case, in which the stricture was at all tight or chronic, I would prefer perinæal lithotrity, as it is not always possible to avoid the contingency to which all persons suffering from stricture are liable—namely, peri-urethral abscess and extravasation of urine, which in this instance caused the death of the patient, though it might have been entirely unconnected with the removal of the stone.

The presence of saccules or recesses in the bladder presents an obstacle in the way of lithotrity, and where they are known to exist lithotomy, as a rule, is indicated. There are two kinds of saccule: one which is usually found above the inter-ureteral bar (Fig. 109), and is formed by a general subsidence of the whole thickness of the bladder, and the other consisting of a hernial protrusion of the mucus through the

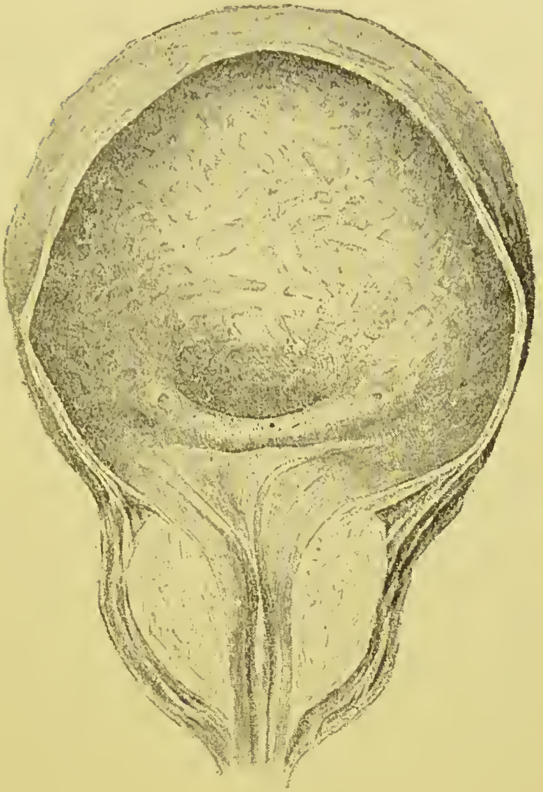

Fig. 109.

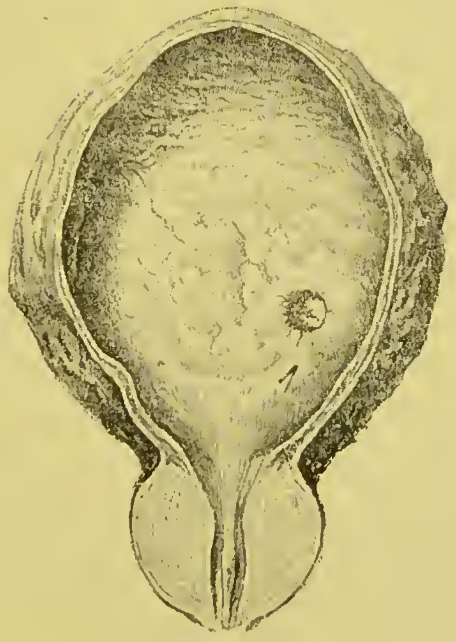

Fig. 110.

meshes of the muscular coat (Fig. 110). The former is the more formidable to the lithotritist, as fragments are almost sure to fall into it after the first breakage of the stone, which it may be found impossible to again seize with the lithotrite. The hernial form of sacculation is more usually situated in other parts of the bladder, and for this reason is less to be feared. It may be met with as the result of strains and pelvic contusions at all periods of life.

On the completion of a crushing operation, the amount of fragments removed should be approximately proportionate to the size of the stone, as determined by the lithotrite. This may be estimated by putting the *débris* in a handkerchief or piece of thin linen, and then screwing it up within the folds so as to form a globular mass. Dr. Alexander * reports a case of stone with sacculation of the female bladder where vaginal lithotomy was performed, and subsequently ligature and amputation of the sac, with a good recovery.

A few remarks may be made in reference to the employment of lithotrity in male children. Having regard to the good results obtained from lithotomy, it seems almost unnecessary to suggest any other operation. Such was my opinion until some years ago, when I happened to be examining a number of calculi removed from children, which were so small as to be capable of being pulverized by one or two grips of the lithotrite. Working in this direction, and making some experiments with calculi of various size and composition, I came to the conclusion that small stones might, in male children, be readily disposed of with the lithotrite without damage to either the urethra or bladder. The following is one of the earliest cases in illustration of this practice:—

Case.—John J., aged 11, during the summer of 1881, was several times at the Liverpool Infirmary for irritability of the bladder. On September 16th I put him under ether, and seized with a lithotrite a lithic acid stone, three-eighths of an inch in diameter, which was crushed. In the course of twenty-four hours the fragments passed spontaneously, and he left the Infirmary in a week.

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* *Liverpool Med.-Chir. Journal*, July, 1884.

Surgeon-Major Keegan * has added important testimony in favour of litholapaxy in male children, having practised this operation largely in India with results which have been most satisfactory. The experience of lithotomy in children in this country has been so generally favourable that I should not feel disposed to materially extend the limit I have illustrated. Many practitioners, who are expert lithotomists, would fail to find the same success in their application of the crushing operation to male children. Some instances have been recorded † where the bladder was ruptured in performing lithotrity, and it is probable that we should have further examples of this if the practice were much extended.

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* *Litholapaxy in Male Children and Adults.* Churchill, 1887.

† *Trans. Pathological Society of London*, Feb. 1, 1887.

THIRTIETH LECTURE.

MEASURES EMPLOYED FOR THE REMOVAL OF STONE FROM THE BLADDER OTHER THAN BY CRUSHING ALONE.

In exceptional cases, operations other than lithotrity may be necessary, and I shall consider those varieties of lithotomy which at the present time are more usually selected. They include (1) those where the bladder is approached from the perinæum, and (2) from above the pubes.

Lateral lithotomy is an operation which has been extensively practised in the male at all periods of life. Recently its application has been restricted, partly by reason of the more general adoption, in some form or other, of lithotrity, and partly in consequence of certain advantages which the supra-pubic method undoubtedly possesses. In the pre-anæsthetic days, when the sufferings of the patients undergoing such proceedings required first consideration, and when speed in the performance of an operation was an important element, there was much to be said in favour of a method by which, under advantageous circumstances, the operation has been ended within a minute by the watch. This is now all changed, and other considerations have our first claim. Lateral lithotomy has much to recommend it, on the ground that it provides a ready and sufficient access to the bladder for the removal of stones of a considerable size, and at the same time enables the surgeon to satisfy himself, almost beyond question, that the whole of the stone therein contained has been removed. In addition, it secures a means for the continuous and incontinent drainage of the bladder in a convenient and dependent position for as long as it may be necessary. Mainly for these reasons, coupled with the small mortality that attends it, at all events in early life, it has obtained in the past, as well as at the present, the confidence of many surgeons of large experience in connection with this class of disorders. These are grounds for its selection which, when combined with personal dexterity and accuracy in its performance, are beyond gainsay.

The patient being placed under an anæsthetic, and retained in the lithotomy position by the crutch or anklets, a full sized staff (Fig. 111) with a lateral groove is passed into the bladder, and held there by an assistant. In young males, where the bladder is an abdominal rather than a pelvic organ, it must be held more obliquely than in the adult; otherwise, as the curve is a short one, the extremity of the instrument may hardly be within the viscus. The bladder should contain, in the adult, at least three or four ounces of fluid, in order that the walls of the viscus may be kept somewhat apart. Previous to the operation an empty and contracted rectum should be secured. The close relation of the rectum, when distended by fæces, with the deeper portion of the urethra is shown in Fig. 112.* Lithotomy is one of the few operations in which from first to last there need be no change in the way the knife is held, as shown in Fig. 113. No other position permits that freedom of movement which is necessary for its dexterous performance. Commencing about an inch in front of the anus, the point of the knife

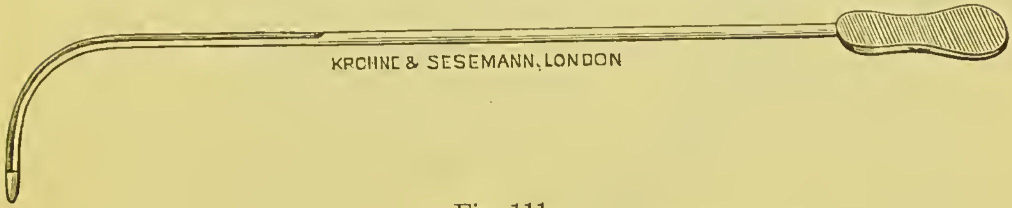

Fig. 111.

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* Braune, *Topographical Anatomy.*

should be steadily directed towards the staff, with the view of touching it in the membranous urethra, below the line of the bulb, the incision being enlarged downwards and outwards to the extent of about two inches, or even more, so far as the superficial structures are concerned, should the size of the

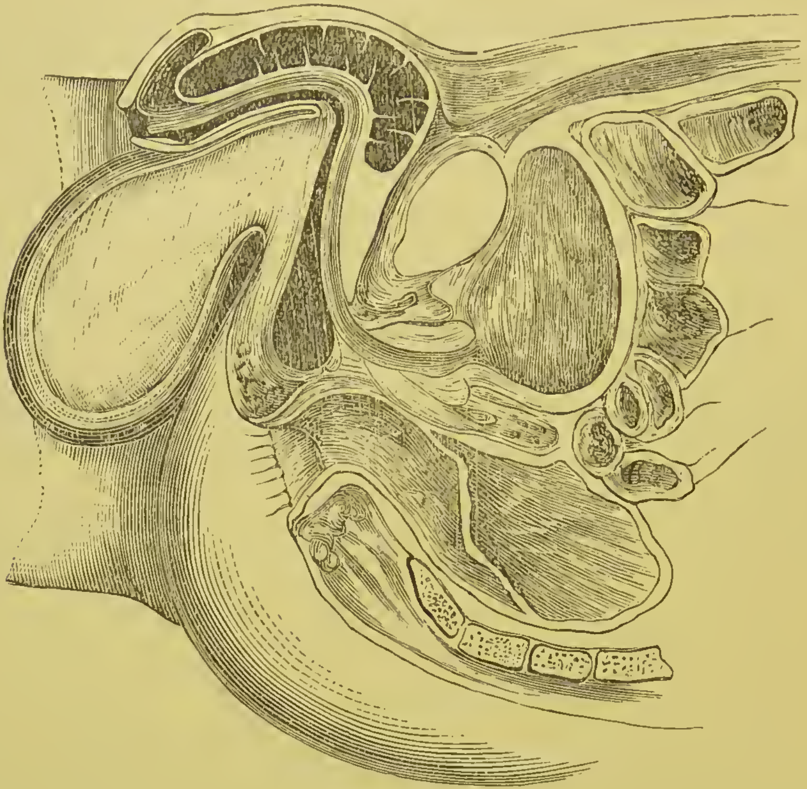

Fig. 112.

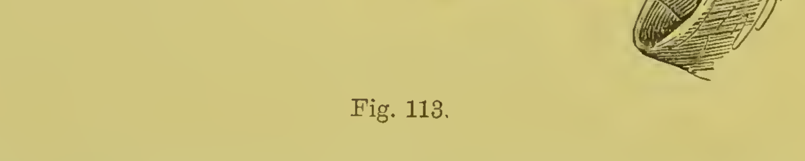

Fig. 113.

stone require it, as the knife is withdrawn. It is assumed that the surgeon has been able to form a tolerably accurate notion of the size of the stone to be removed. If the incision is fully made, both in depth and direction, the staff will at once be felt by the finger of the other hand, or be so nearly bared as only to require a touch or so with the point of the knife. The bladder is then opened by cautiously pushing on the knife in the groove of the staff, the edge being directed obliquely outwards, so as to incise the prostate in a direction corresponding with its greater radius.

Various modifications have been made in the staff which guides the knife into the bladder after the perinæum has been opened. Much has been said in favour of the rectangular staff introduced by Dr. Andrew Buchanan in 1848 (Fig. 114), on the ground that it facilitates the steps of the operation by substituting a straight for a curvilinear groove in which the point of the knife runs. Though I have seen surgeons cut with much dexterity on the rectangular staff, I have never felt tempted to forsake the curved one with the slightly lateral groove. Habit undoubtedly has much to do with the acquirement both of confidence and dexterity. Not many surgeons would prefer to cut for stone with the lithotome (Figs. 115 and 116), yet Dr. Alan P. Smith,* of Baltimore, attributes a large amount of his success to its use. Mr. Durham speaks very favourably of Aston Key's straight staff, which I believe he generally uses. The long beaked staff described by Dr. J. Ward Cousins † also possesses some advantages.

When the point of the knife touches the staff, as the first incision into the perinæum is made, there is little difficulty in making the deeper one. We sometimes hear of cases in which the bladder has not been reached. This can hardly

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* "A Report of Fifty-two Successful Cases," *Trans. Med. and Chir. Faculty of Maryland*, U.S.A., 1878.

† *British Medical Journal*, vol. ii., 1882.

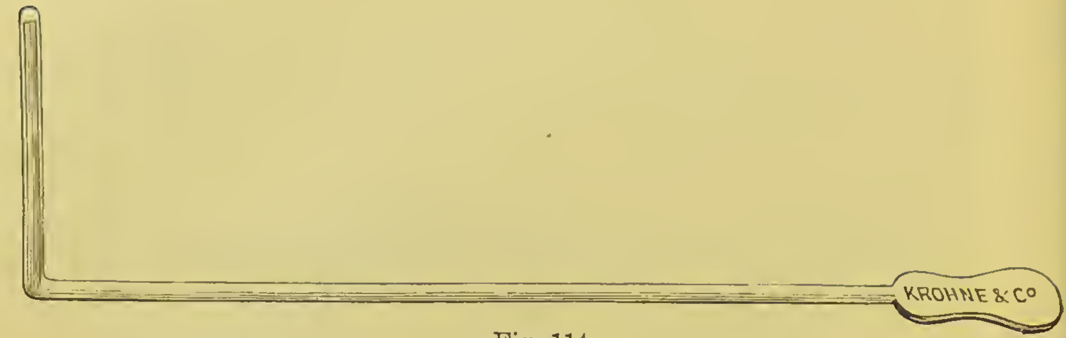

Fig. 114.

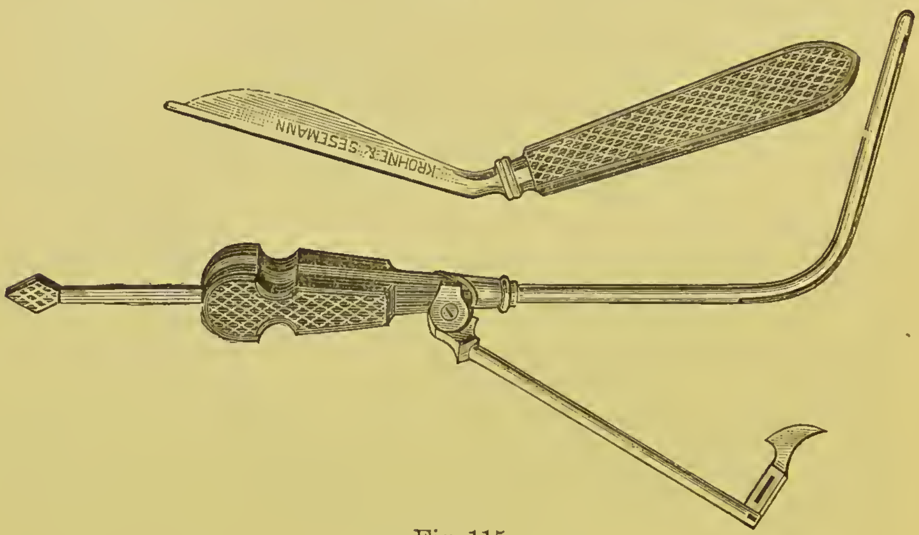

Fig. 115.

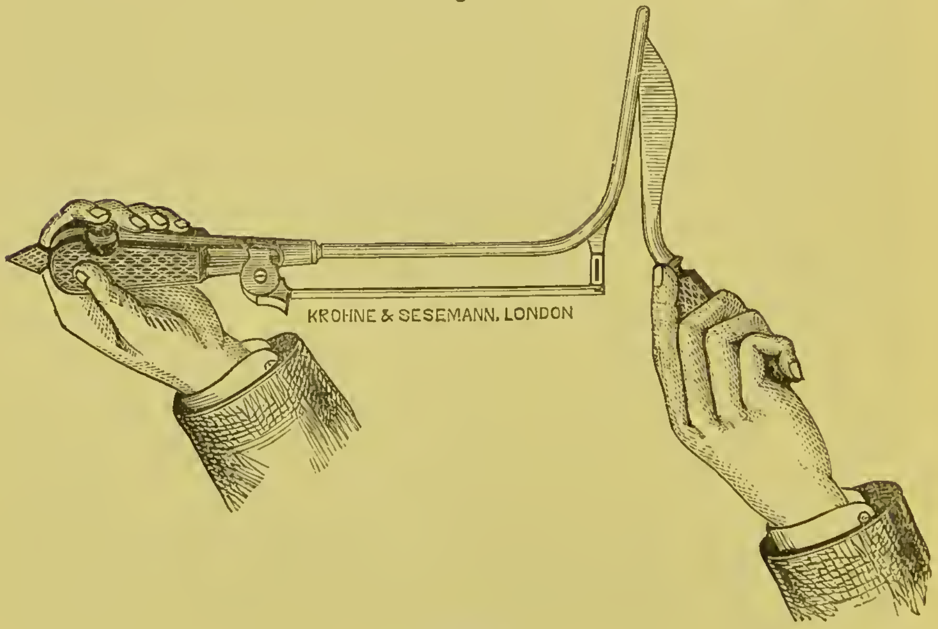

Fig. 116.

happen, assuming the staff to be correctly held, if, after the perinæum is opened, the index finger of the operator's left hand (the right hand being occupied by the knife) is confined to *gently feeling* for the staff, or protecting the rectum from risk of injury. When the first incision penetrates but little beneath the skin of the perinæum (as often occurs in first operations), the distance to the staff appears so great that a process of boring or tunneling with the finger towards the staff, rather than cutting with the knife, sometimes ensues. If this is continued, either the operator is landed between the bladder and the rectum, or the urethra gets torn across, and the way to the bladder is lost. When the staff is *felt* to be bared, then the nail of the left index finger serves as a guide for steadying the point of the knife in the groove prior to the commencement of the deeper incision. It will be observed that no attempt is made to dilate the urethra with the finger for the purpose of entering the bladder. The deep incision along the groove in the staff should be made sufficiently free, so far as the prostate is concerned, to permit an average-sized index finger to enter the bladder with tolerable ease, whilst, on the other hand, it must stop short of a complete section of the part.

It will be seen that the introduction of the finger into the bladder is one of the conditions of the operation of lithotomy, whether performed in the child or adult, and there need be no difficulty in determining the precise means by which this object may be obtained with the least amount of risk. In the adult, if, when the perinæum has been opened, the handle of the staff is held vertically whilst the blade of the knife is pushed on towards the bladder nearly parallel with the direction of the groove in which it is lodged, no fear need be apprehended of exceeding the proper limits of an incision into the prostate. If, on the contrary, the handle of the staff be too much depressed, whilst at the same time the *point* alone of the knife is carried along in the groove, the range of the incision may become so extensive as to include more than the prostate in the section. In this way, not only has the gland and its capsule been cut completely through, but even the trigone has been invaded.

The accompanying diagram (Fig. 117) is a representation of a vertical section of a frozen prostate taken from a healthy man, aged thirty-five. It is introduced for the purpose of indicating the extent to which the part may be incised in various directions shown by the black lines, and the probable amount of room that such incisions would afford. When the finger is in the bladder, it is easy to extend the incision with a probe-pointed knife, should dilatation not suffice either for introducing the forceps or extracting the stone. If the opening will not allow of the easy passage of the forceps *into* the bladder, it is not to be expected that they can be withdrawn with a stone between their jaws without inflicting unnecessary damage to, if not tearing, the parts constituting the neck of the viscus.

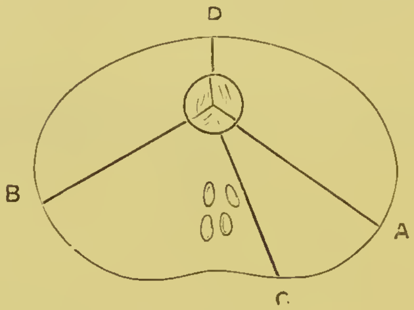

Fig. 117.

A. Lateral incision.
A.B. Bi-lateral do.
C. Downward do.
D. Upward do.

Curved and straight pairs of lithotomy forceps (Figs. 118 and 119) should be at hand, and, in withdrawing the stone, only gentle traction forwards and slightly downwards is to be exercised. Angular stones, or those with spike-like processes, are sometimes more or less embedded in the walls of the bladder (Fig. 82). When this is the case, the position of the calculus must be altered before it can be withdrawn by the forceps, otherwise the floor or neck of the bladder may be torn. I have known stones rendered stationary in this manner spoken of as being adherent to the walls of the bladder, such a connection being, of course, only a mechanical one. It is well to have one or two different shaped forceps in readiness so as to secure a fairly accurate adaptation to the stone. Figure 120 shows how an unnecessary amount of room may be taken up where the forceps and stone are not well fitted to each other. A scoop and a Higginson's syringe for washing out the bladder through the wound are

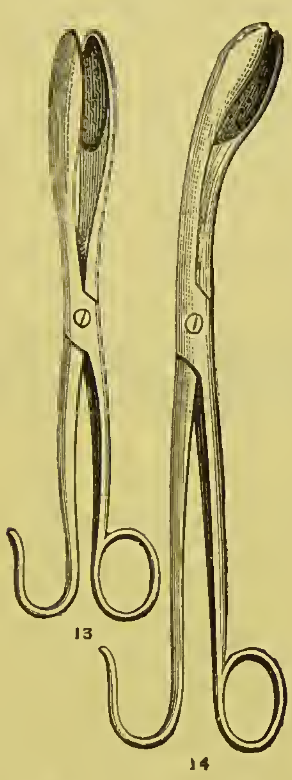

Fig. 118. Fig. 119.

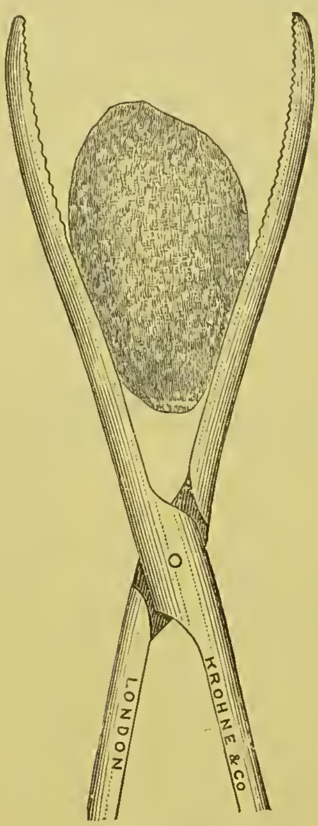

Fig. 120.

MEDICAL LIBRARY BATH

sometimes required when the stone breaks on being seized with the forceps. Sir George Humphrey seems to have a preference for the scoop.[*] When the stone is large, too large to come away without the exercise of such force in extraction as might tear—not stretch—the neck of the bladder, a corresponding incision on the opposite side of the prostate may be made with a straight probe-pointed knife (Fig. 121) on the operator's left index finger passed fairly within the bladder, should an extension of the existing incision be insufficient. On some occasions I have thus made a bilateral incision with success. In one instance where it was employed, it permitted me to remove, without hæmorrhage, a prostatic tumour (an adenoma), in addition to an oxalate stone weighing nearly three ounces.

To anyone practically unacquainted with lateral lithotomy it may appear that attention to the many details it includes must necessitate some time being taken up in its performance. Such, however, is not the case; and though care is to be commended rather than speed, there is nothing, in cases free from complication, to prevent the operation being safely accomplished in a few seconds. Rapidity in manipulation must, however, come naturally, rather than be aimed at. The object of the operator is to extract the stone from the bladder without exposing the patient to unnecessary risk, and so long as the surgeon accomplishes this, he may regard the time occupied, whatever it may be, as well spent.

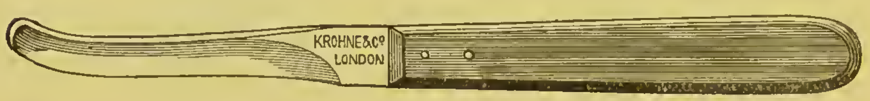

Fig. 121.

After a stone has been extracted, the bladder should be carefully searched to ascertain that it is clear. The index finger is the most trustworthy explorer, aided by downward

[*] *Lancet*, June 1, 1872.

pressure with the other hand above the pubes. If these means be found insufficient, an ordinary sound may be introduced through the wound. I usually introduce a tube (Fig. 24) through the wound into the bladder to prevent any clots obstructing the free discharge of urine. If there is considerable oozing of blood from vessels that cannot be tied, I make the tube fit accurately by the introduction of one or two sutures either above or below it, as I have described in the Eighth Lecture. When an artery has been divided, and is evidently spouting, it must be tied; this can generally be done without much difficulty with the aid of retractors; to plug a severed vessel, if it is possible to avoid it, is to court the recurrence of bleeding. More usually I have noticed in section of the prostate and the adjacent parts the bleeding is of an oozing nature, as if from spongy textures, but in this way many ounces of blood may be lost. For restraining hæmorrhage Mr. Buckston Browne's dilatable tampon will be found serviceable (Fig. 122).

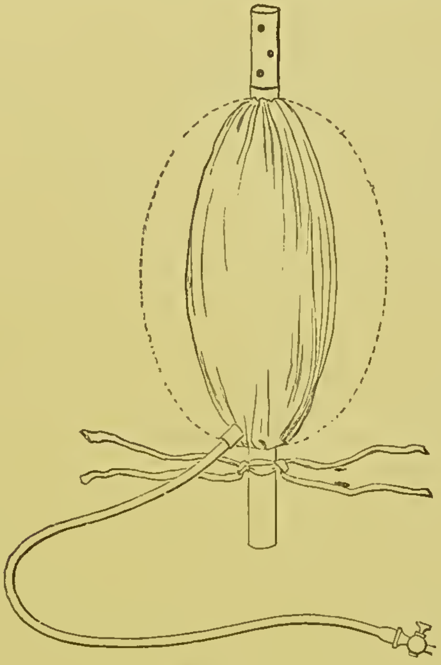

Fig. 122.

As to the after-treatment of lateral lithotomy there is little to be said beyond what applies to all operations in surgery, in regard to cleanliness, ventilation, drainage, and proper feeding. The old surgeons on visiting a patient after lithotomy were in the habit of asking "Does he wet well?"* To-day we should say, "How does he drain?" The drainage of the wound is favoured by slightly elevating the head of the bed, and the patient is to be kept dry by a good supply of ordinary or wood-wool draw-sheets. The food should be of such a character as not to require an action of the bowels for some days, the first movement, if not spontaneous, being promoted by a warm-water enema. One of the few cases of secondary hæmorrhage after lithotomy I have seen was traceable to an attack of diarrhœa, provoked by the patient having been surreptitiously supplied with fruit soon after the operation. I seldom wait for the wound to entirely close before allowing the patient to sit up, as when risk of bleeding is over there is no object in the patient being confined to bed. In cases of lithotomy in old persons, it is of importance to get them up as soon as it can be safely done. Urine usually begins to pass through the urethra about the tenth day, the first discharge *per viam naturalem* not unfrequently being followed by a chill or rigor, which, so occurring, need not occasion alarm. This is about the only rigor following an operation which is not to be regarded with a suspicion that it may forbode something worse.

The chief objections urged against lateral lithotomy, apart from the fact that the operation is one entailing considerable skill in its performance, are based on some isolated cases when a fistulous tract, incontinence of urine, or sterility have followed it. When this has been the case such consequences are usually traceable, not to any fault in the original design of the operation, but to unanticipated circumstances which have arisen in individual cases entailing a greater section or distension of the parts, either with the knife or in the withdrawal of the stone. Where care is taken to provide against such contingencies by keeping the incision within the defined bounds, and the stone within the dimensions thus made for its removal, as will be referred to later in connection with perinæal lithotomy, such consequences need not be apprehended. This operation was frequently referred to by the late Sir William Fergusson as "the master handiwork in surgery."*

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* *Miscellanea Med.-Chir.*, by Mr. E. L. Hussey.

In reference to injuring the seminal apparatus, Mr. Golding Bird remarks:† "The anatomical danger of cutting one, or, if carelessly done, both ejaculatory ducts by the lateral method is recognised; but is it proved, if even the accident occur, that any permanent lesion, anatomical or physiological, results? The writer has Mr. Cock's authority for stating that in all his experience of lithotomy (over 200 cases) he has never known injury in this direction result; and he has in his recollection a remark of Sir Astley Cooper to the same effect, 'one case only excepted.' That was one of a very large stone, in which Sir Astley had to use the knife freely, and some time after his recovery the patient remarked that he had suffered some injury, inasmuch as he 'felt something pass backwards into the bladder' during a certain physiological act. Mr. Cock can add but one case only in which the seminal ducts were injured (or one of them) by operation, and this was after the puncture *per rectum* for retention of urine. Some time afterwards the testis on one side was observed to dwindle, and it finally became completely atrophied, this being attributed to division and subsequent closure of its excretory duct. Even were the duct injured in the course of lithotomy, the known difficulty of occluding by adhesion a mucous tract, however small, renders it very unlikely that the exit of the semen into the urethra would be injured; most probably its path would be only somewhat short-circuited. Injury of the duct with occlusion during cicatrisation would be certainly followed by gland-atrophy, and this is not a sequence of lateral lithotomy."

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* *Lancet*, Jan. 1, 1870.

† *British Medical Journal*, March 5, 1887.

It is hardly necessary to illustrate an operation the application of which is so well understood. The two following cases present some special points of interest which appear worth recording:—

Case.—Thomas R., aged 14, had symptoms of vesical irritation for over ten years. The patient had occasionally passed blood, and suffered from retention requiring catheterism. It appeared that on one of these occasions, when catheterism was employed, some damage had been done to the parts about the neck of the bladder, for though the patient had all the symptoms of stone, none could be felt with the sound. It was not until the second occasion of examining him that I felt the stone and satisfied myself as to the position of the sound. On Feb. 20th, 1879, I had the patient brought into the operating theatre for the purpose of performing lithotomy. On the staff being passed, it seemed in the wrong place, and the calculus could only be indistinctly felt. Rather than incur the risk of doing damage by attempts to get the instrument in its proper position or operate with any uncertainty, I sent the patient back to bed.

On March 5th the patient was again put on the operating table, when, before he was placed in position, I passed the staff to my satisfaction. The operation of lateral lithotomy was performed without difficulty; some cicatricial tissues about the deep urethra, probably indicating the position of an old false route, were cut through, and a mulberry calculus removed. The patient made a good recovery, and returned home on April 16th.

I have only one observation to make, and that has reference to the postponement of the operation. I would not have been justified in proceeding if I had doubt as to the position of the staff, and I preferred to disappoint my class assembled to witness the operation rather than incur such a risk, feeling assured that an attempt on another day would result in the removal of all obscurity.

The next case furnishes an example of the rarest form of calculus—namely, the cystin or cystic oxide. This I believe is the largest of the kind that has hitherto been removed by lithotomy.

Case.—James D., aged 21, a labourer, was admitted into the Liverpool Infirmary on February 19th, 1879, suffering from symptoms of stone in the bladder extending over four years, during which period, on several occasions, he had suffered from retention requiring catheterism, and had passed blood. Upon sounding him with a lithotrite, I found that the bladder contained a hard stone measuring 2 by 1¾ inches, which determined me to select lithotomy. This operation I performed on February 25th, 1879, Mr. Rushton Parker holding the staff for me, when I found the stone too large to extract by the ordinary incision. To avoid either tearing the tissue, or over-stretching the neck of the bladder, I divided the prostate bilaterally with a straight probe-pointed knife, which gave the required space, and the calculus was then readily extracted. The operation was followed by some febrile excitement on the 26th, the temperature reaching 104°. This was the highest point attained, from which the pyrexia gradually declined, and by the seventh day the normal condition was gained. The patient made a good and rapid recovery.

The calculus weighed 1,050 grains. I am indebted to Professor Campbell Brown for the following analysis: "I find that it consists of cystin or cystic oxide, with a small quantity of ammonia, magnesium-phosphate, and only a trace of calcium-phosphate. The hard, waxy, crystalline granules are well marked, and belong to the hexagonal system of crystallisation: by solution and recrystallisation the hexagonal plates are obtained perfect." The urine was examined several times after the operation, but no cystin was detected. I find that previously to this the largest cystin calculus extant was one in University College Museum, which was removed by Liston, and weighed over 850 grains. The Museum of the Royal College of Surgeons, out of a total of about one thousand calculi, contains but few specimens of the cystin variety, including half the one removed in this case. I see that it has already undergone considerable alteration in colour, having assumed a greenish hue.

The median operation for stone may be regarded as the simplest proceeding where the use of the knife is required. It is conducted in accordance with the directions given in the Eighth Lecture (page 101), the incision being made somewhat larger than the opening for drainage punctures, so as to permit of the introduction of the lithotomy forceps and the withdrawal of the stone. After this has been done a drainage-tube should be passed into the bladder, otherwise retention of urine or a rigor is not unlikely to follow. As thus practised it is only limited to small stones, which might, as a rule, be easily disposed of with the lithotrite. It is, however, capable of being adapted to much larger calculi in two different ways: (1) by the extension of the incision so as to give more room for whatever has to be withdrawn from the bladder; and (2) by combining it with means for crushing and evacuating the stone by this shorter route.

The ordinary median operation for stone may be extended in the following manner: On the finger being introduced into the bladder as for digital exploration by perinæal urethrotomy, the membranous urethra may be opened up by passing a curved probe-pointed bistoury into it, with the edge directed towards the operator, from the wound; in this incision may be included more or less of the entire thickness of the perinæum. A further extension is made by passing the curved probe-pointed bistoury by the side of the finger well into the bladder. The edge is turned towards the rectum, and the floor of the prostate is divided from within outwards, commencing in the depression which more or less exists at the entrance to the urethra. The incision thus made may be extended downwards to the capsule by the firm pressure of the finger. In this way as free an opening into the bladder may be made in the median line of the body as by a lateral lithotomy, and with no risk of causing hæmorrhage. I believe this will be found a simple and safe way of opening the bladder for the removal of stones, which, without these modifications, could only be effected either by lateral or supra-pubic cystotomy. Further, it provides for an incontinent flow of urine from the bladder, which usually continues for some days. These extensions of the ordinary median operation for stone were carefully tested on the dead subject; and since the last edition of this work was published I have on several occasions practised this modification with ease and advantage.

The vertical division of the prostate was advocated by Vacca Berlinghieri * at the commencement of this century, but chiefly in connection with the recto-vesical operation, which has now become obsolete. A reference to Vacca's plates shows that he made his incision through the floor of the prostate, a little to one side of the median line, with the view of avoiding the seminal openings. In the course of a number of operations on the obstructing prostate † I found that it was almost impossible to make a safe and satisfactory division of the prostate, whether normal or enlarged, from a median urethrotomy, except in a direction from within outwards, as described; and, further, that the full effect of such a section could not be wholly appreciated as a means of free access into the bladder unless it was accompanied with the division along its floor of the membranous urethra, as this, in conjunction with the bulbous portion of the canal, seemed to arch in the outlet from the bladder, and to restrict manipula-

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* *Della Litotomia*, Pisa, 1825.

† *Trans. International Med. Congress*, Copenhagen, 1884.

tions within this viscus. In connection with the making of the deep incision through the prostate in a direction from within outwards on a guide, it would appear from the surgical lectures of Dr. Alexander Monro, of Edinburgh, that Frère Côme, a successful lithotomist of the last century, was in the habit of incising in this way, thus avoiding some of the dangers which befel his contemporaries.

I will illustrate some of these points by the following case, where the feebleness of the patient and the nature of the complications rendered the task of deciding what ought to be done a difficult one:—

Case.—C. B., stated to be fifty-six years of age, but looking about seventy, was admitted into the Liverpool Royal Infirmary on March 9, 1887, having been sent to me by Dr. M. J. Campbell. He had previously been in hospital for an impassable stricture, and he presented the appearance, mentally and physically, of a feeble old man. I found him suffering from a narrow long stricture in front of the bulb, a false passage of some length and more easily entered than the natural canal, a stone in the urethra behind the stricture, a large prostate, one or more stones in the bladder, and cystitis. He passed his urine in drops incontinently, and his clothing and bedding were soaked with ammoniacal urine. On March 29th, 1887, Dr. Paul Rodet, of Vittel, and Dr. Wilson, of Boston, U.S.A., being present, the patient was etherised, and a filiform bougie having previously been passed, the stricture was divulsed (Fig. 23) so as to allow a moderate-sized grooved staff to be passed into the bladder. He was then placed in the lithotomy position, when I performed a median perinæal urethrotomy, and extracted a uric acid calculus wedged in behind the stricture. I divided the floor of the membranous urethra, including a mass of cicatricial tissue constituting the stricture. Passing my finger into the bladder, I incised the large prostate downwards with a curved probe-pointed bistoury from within outwards, completing my incision to the limit of the prostatic capsule by the pressure of my index finger. In this way I had made an opening into the bladder in the median line which would readily admit my finger. Forceps were then introduced into the bladder, and I extracted two moderate-sized calculi, one uric acid, and the other phosphatic; in addition, a considerable quantity of soft putty-like phosphatic incrustation was also removed. No vessels required tying, and the patient did not lose an ounce of blood. As a precaution against any secondary bleeding, a double drainage-tube was introduced, and the wound above and below closed with sutures so as to make the tube fit with some tightness. The patient's convalescence was uninterrupted. He was up on April 10th, went out for exercise on the 14th, and was discharged well on May 5th. His urethra, commencing in the penile portion down to the anterior limit of the incision, was so damaged by old standing strictures and false routes of cicatricial hardness that, though a whip bougie could be passed the whole length of the canal, I advised him to retain as a permanency his perinæal opening. This proved an excellent solution of the difficulties which were inseparably connected with his complications, age, and feebleness, and he continues to enjoy good health.

The chief advantages of the median method I have described may be briefly summarised as: (1) That an incision is made into the bladder along the median line, which gives as much room, if not more, for manipulation as a lateral. (2) That the liability to hæmorrhage, as compared with the lateral method, is less, whilst the facility for getting at any bleeding point is increased. (3) That it adapts the median procedure to a wider range of stone as well as of tumour cases. (4) That, like after lateral lithotomy, temporary incontinence of urine and thorough drainage are secured, should these be desirable.

(2) The second method of utilising median urethrotomy for the removal of stone from the bladder consists in breaking the stone into such fragments as will permit of their withdrawal without any extension of the ordinary incision. Perinæal lithotrity, as this operation may be called, has been

referred to by Dr. Gouley,[*] of New York, in the following words: "The name of perinæal lithotrity was given in 1862 by Professor Dolbeau,[†] of Paris, to an operation completed in one sitting, by which the membranous portion of the urethra is opened, the prostate and neck of the bladder dilated instead of being cut, and a large stone crushed, and the fragments immediately extracted."

Based upon some experience I have had in breaking stones before withdrawing them through the ordinary incision for lithotomy, I published [‡] a paper on this subject, which contained the following case:—

Case.—A man, aged 18, was under my care in the Liverpool Royal Infirmary during 1887. He was suffering from a large phosphatic stone in the bladder, which it was thought could be removed by litholapaxy. The patient being placed under ether, I found it impossible to grasp the stone with the lithotrite in such a way as to enable me to crush it, for, though I could seize it, the blades could not be approximated to permit of my locking the instrument. I therefore proceeded with a perinæal lithotrity, making a superficial incision as for lateral lithotomy on a grooved staff. I opened the membranous urethra, and readily passed my finger on into the bladder, as for ordinary exploration. Finding the calculus to be fully as large as anticipated, a strong pair of forceps was introduced into the bladder, with which the stone was crushed and extracted. When the finger showed the bladder was free it was washed out with a perchloride solution, and a drainage-tube inserted. The tube was kept in for four days, and then withdrawn; the patient was well and up on the eleventh day, passing all his urine by the urethra. Though the stone weighed about three ounces, it was broken up and evacuated in something under five minutes. In three other cases referred to, a similar proceeding was practised. In one of these the stone was uric acid, the remaining two being phosphatic. In two the ordinary median boutonnière operation was practised, whilst in the third a preliminary lateral incision was made, as in the case narrated in detail.

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[*] *Diseases of the Urinary Organs*, 1873. Wood & Co., New York.

[†] *De la Lithotritie Périnéale*, Paris, 1872.

[‡] *Lancet*, Sept. 22, 1888.

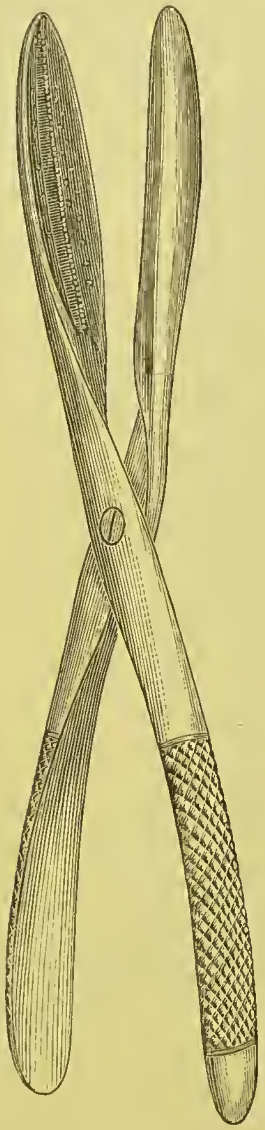

Fig. 123.

Since this communication was made, Messrs. Krohne and Sesemann have made for me some crushing forceps, straight (Fig. 123) and curved, which can be passed into the bladder through a perinæal urethrotomy admitting the index finger as for digital exploration. These forceps are provided with a cutting rib within the blades. The more powerful instruments are fitted with a movable screw on the handle (Fig. 124). The fragments may subsequently be withdrawn by aspirator catheters passed through the wound, or even by the forceps. If care is taken to make the perinæal wound correspond in size with the evacuating catheters there is no difficulty in keeping the bladder distended with fluid during the necessary manipulations.

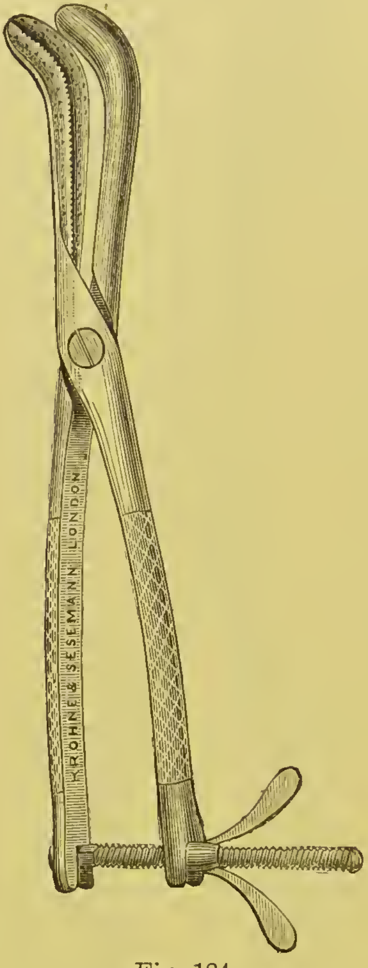

Fig. 124.

I have selected this method in twelve instances, and have so far had no deaths or recurrences of stone following it.

The chief points in its favour are these: (1) It enables the operator to crush and evacuate large stones in a short space of time. (2) It is attended with a very small risk to life as compared with other operations where any cutting is done, such as lateral or supra-pubic lithotomy, and is well adapted to old and feeble subjects. In his recent address, Mr. Swinford Edwards* shows that the latter operation for large stones has a mortality somewhere about 50 per cent. (3) It permits the operator to wash out the bladder and any pouches connected with it more effectually than by the urethra, as the route is shorter and the evacuating catheters employed of much larger calibre. (4) The surgeon can usually ascertain, either by exploration with the finger or by the introduction of forceps into the bladder, that the viscus is cleared of all *débris*. (5) It enables the surgeon to deal with certain forms of prostatic outgrowth and obstruction complicated with atony of the bladder in such a way as to secure not only the removal of the stone, but the restoration of the function of micturition. (6) By the subsequent introduction and temporary retention of a soft rubber drainage-tube, states of cystitis due to the retention of urine in pouches and depressions in the bladder wall are either entirely cured or are permanently improved. To lock up unhealthy ammoniacal urine in a bladder that cannot properly empty itself after a lithotrity, is to court the formation or recurrence of a phosphatic stone. Hence it is well suited to some cases of recurrent calculus. I have never known the wound to remain unhealed, except in those instances where, for some reason or other, it has been desired to construct a low-level urethra, as in the instance recorded.

It is well adapted for some cases of stone in the bladder complicated with stricture in the deep urethra, as it enables the surgeon to deal with both at the same time. Nor does it expose the patient to the risk which may be attendant where lithotrity is performed with a weakened or permanently damaged urethra, as illustrated in a preceding case (page 440). Dr. Bazy[*] has also recently illustrated its advantages under these circumstances. Surgeon-Major Forbes Keith[†] advocates this operation in cases of stone, and describes a lithotrite specially made for this purpose. I think, however, breaking forceps will be found preferable. Dr. Bangs[‡] records a case of recurrent calculus of much interest, where dilatation of the prostatic urethra through a perinæal opening was effected for the purpose of crushing and extracting the stone by means of Dolbeau's dilator (Fig. 125). The instrument is expanded by a screw arrangement at the handle. Commenting upon this patient, Dr. Bangs observes :—

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* "Urinary Surgery," *Medical Press*, Oct. 12, 1892.

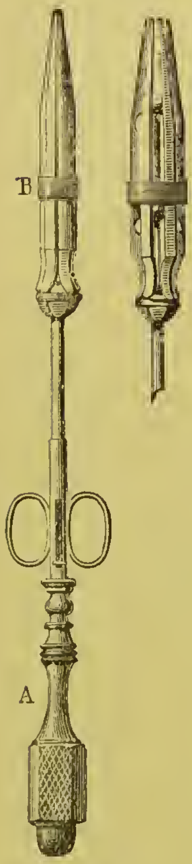

Fig. 125.

"He is able to urinate spontaneously standing, and in a full stream, and when the catheter is passed once a day for the purpose of washing there is only one, and rarely two, ounces of residual urine. This improvement in his power of urination is the result to which I wish to call special attention. During the first operation (supra-pubic cystotomy) the apparent obstacles to urination, namely, the prostatic outgrowths and the calculus, had been removed; and after the operation the bladder had been drained as long and kept as clean as after the second. But there was very little spontaneous urination, and the act was accomplished with a hesitating dribbling stream, leaving a notable quantity of residual urine to decompose and fret an already irritable bladder. After the perinæal operation, however, he was able to stand up, and almost entirely empty his bladder in a strong full stream, with every sense of comfort. An explanation of the difference in the result must be sought for, and I think is to be found in the enormous dilatation to which the prostatic urethra was subjected in the perinæal operation. This fact has, I believe, an important bearing upon the many failures to obtain spontaneous urination after prostatectomy."

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[*] *La Semaine Médicale*, Feb. 17, 1893.

[†] *Lancet*, June 11, 1892.

[‡] *Annals of Surgery*, April, 1893.

This is a conclusion and a result which I can endorse from my own experience. As bearing upon one point in connection with this class of cases I would make reference to what has, not very unfrequently, been observed in connection with the operation of lithotomy, where long-continued atony or paralysis of the bladder had previously existed. In the instance of a patient (H. G.), 69 years of age, who is now alive, with complete power over micturition, I opened his bladder from the perinæum, and divided the floor of a greatly enlarged prostate, at the same time removing some phosphatic stones which were probably connected with the long-continuing inflammation. After the prostate had thus been divided, a drainage-tube was used as I have described. Previous to this operation, which was performed in 1887, the patient had been entirely dependent on the catheter for four years, during two of which he had worn the instrument continuously both by day and night. Had I in this instance contented myself by removing these phosphatic concretions, as I could easily have done with the lithotrite, the patient, I have not the least doubt, would never have recovered his bladder power, and in all probability have spent the remainder of his existence in the twofold employment of making stones and having them removed.

Stone in female adults and children is comparatively rare, which is probably due to the short urethra favouring the escape of a calculus at the earliest period of its formation. Concretions on foreign bodies, such as hair-pins, are not unfrequently met with, and the possibility of a stony mass having a nucleus of this kind must not be lost sight of in connection with their removal. Instances are recorded where the jaws of the lithotrite became entangled in wires and hair-pins, upon which a phosphatic deposit had taken place, during attempts made to remove the foreign body in this manner.

Where the stone is not large, removal may be undertaken by rapid dilatation of the urethra and extraction of the calculus with forceps. If dilatation is extreme more or less permanent incontinence of urine may result, a condition which is most distressing to the patient, as it is not easily remedied. As indicating the extent to which the female urethra may with safety be dilated for the purpose either of exploration or of extracting a stone, the following passage from a recent author may be quoted: "Simon's statements have now been verified by general experience. Hence, since the average diameter of a man's right index finger at its thickest part is about ¾-inch (1·8 cm.), and of his little finger ⅝-inch (1·5 cm.), it may be stated that we can safely dilate the adult urethra so as to admit the index finger, and the child's so as to admit the little finger."* These limits should not be exceeded, otherwise a risk of permanent incontinence is incurred.

In the case of large stones, which cannot be included within the grip of the lithotrite, removal has been effected by supra-pubic or vaginal lithotomy. The latter operation consists in opening the vaginal wall of the bladder by a median incision, and, after extracting the stone by forceps, reuniting the edges of the wound by sutures, as is done for vesico-vaginal fistula, as described by Dr. Warren.† Dr. Galabin has recorded a case where by this operation he removed twelve large calculi and about fifty small ones from the bladder of a woman aged sixty-one. The wound was closed by silkworm gut sutures, and at the end of ten days union was complete.* Vaginal lithotomy has been almost entirely supplanted by lithotrity and the high operation.

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* "On the Operation for Stone in the Female Bladder," by Professor A. Ogston, M.D., *Edin. Med. Journal*, July, 1879.

† "On Vaginal Lithotomy," by J. C. Warren, M.D., *Boston Medical and Surgical Journal*, July 20, 1876.

For some time I have removed all stones from female children without practising any more dilatation of the urethra than was sufficient to introduce a lithotrite of the calibre of a No. 12 English catheter, followed by the evacuation of the fragments with the aspirator. Since adopting this plan I have not met with incontinence afterwards, and the operation has consequently been reduced to one of the simplest of its kind. In the following case, by reason of the size and hardness of the stone, the operation was submitted to what may be regarded as a fair test :—

Case.—M. A. M., aged 9, was admitted into the Liverpool Royal Infirmary on June 3, 1885. The patient was delicate, and had suffered from symptoms referable to the bladder for many months. On examination a mulberry stone, an inch and a half diameter, was detected in the bladder for which lithotrity was performed. I had to employ the fenestrated instrument and considerable force before the stone was completely triturated. The fragments were removed with the aspirator and wash-bottle and ordinary dressing forceps. Six days after the operation the patient left the hospital, and all traces of her disorder soon disappeared. The stone fragments, oxalate, with some phosphates, weighed half an ounce.

In the present day we are not likely to meet with many cases where female children develop larger stones than the size here recorded, and consequently lithotrity, without dilatation, will generally be found applicable. Some years ago I assisted the late Dr. Lyster to remove from a woman a lithic acid calculus lodged in a sac in the floor of the urethra. The stone was of an oval shape, and measured 1½ inch in length and $\frac{3}{4}$ inch in breadth. Removal was effected by dilating the canal with Weiss's instrument, and extracting with forceps. The patient recovered without a bad symptom. Phosphatic concretion on the walls of the bladder is met with both in males and females. A well-marked instance of this I saw, where the mucous membrane of the bladder in a female was deeply encrusted with this deposit, which appeared to have taken its origin from a rough scar following the closure of a vesico-vaginal fistula. It was necessary to dilate the urethra, and then with the finger to peel off, as far as possible, the concretion. This was followed up by injections of a weak solution of nitric acid, under which treatment the patient progressed satisfactorily. In the course of time the cicatrix seemed to improve, and eventually the cystitis entirely ceased. In plastic operations on the bladder wall care must be taken to remove all sutures or parts of them, otherwise they may cause cystitis and phosphatic concretion. The electric cystoscope * has occasionally been the means of leading to the detection and removal of a foreign body of this kind.

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* *Obstetrical Society's Trans.*, April 7, 1880.

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* *Atlas of Elcctric Cystoscopy.* Burckhardt and Fenwick, 1893.

THIRTY-FIRST LECTURE.

Supra-pubic Cystotomy.

The revival of supra-pubic cystotomy is, in a large measure, due to the observations of Garson,* the practice of Petersen,† of Kiel, and the advocacy of Sir Henry Thompson.‡ I propose to refer to this operation in its application to (1) stone in the bladder, (2) tumours and growths, including hypertrophy of the prostate encroaching upon the interior of the bladder, (3) foreign bodies, and (4) other conditions requiring the inspection of the interior of the bladder and drainage. In all these states, subject to some modifications, it has been applied with success. I will, first of all, describe the method of operating.

The patient may be placed either recumbent, as for an abdominal operation, or with the pelvis elevated, as in what is known as Trendelenburg's position. In the former case it was usual to distend the bladder with some ounces of water, and likewise the rectum, by means of an elastic air-bag capable of inflation; the object of this being not only to make the outline of the viscus more prominent but to increase, as it is alleged, the space immediately above the pubes where the bladder is uncovered with peritonæum. Such means are not now insisted upon, beyond retaining a few ounces of water, hardly amounting to distension. The rectum bag, in the majority of instances, is unnecessary, unless it is used with the object of enabling the operator, after the bladder has been opened, to reach the posterior wall with his finger, which in corpulent persons would otherwise be impossible. I much doubt whether the area above the pubes, uncovered by peritonæum, is increased by the combined distension of the bladder and rectum, as first proposed, unless it is practised with such an amount of force as to render the proceeding, in the case of a weak bladder, somewhat hazardous. Rupture of the bladder as well as the bowel has in this way been caused. A patient with a stricture and a distended bladder was placed on the operating table in Bellevue Hospital, New York, for the purpose of having the former relieved.* Whilst struggling under ether the abdominal tumour suddenly disappeared, and the former area of dulness became tympanitic. At a *post-mortem* examination the bladder was found ruptured, without ulceration or other alteration. No doubt the distension in this case was considerable, as two quarts and a half of bloody fluid were found in the abdomen. The bladder having been washed out, a few ounces of boracic solution being left within it, secured there by a ligature round the penis, and the pubes shaved, the operation may now be proceeded with. When Trendelenburg's position is selected, the patient is placed as shown in the illustration (Fig. 126).† It has some advantages, as the intestinal pressure tends to gravitate towards the thorax and away from the wound. The operator then proceeds to open the bladder, either by the vertical or transverse incision. In the former case, standing on the left side of the patient, he commences immediately above the bony margin of the pubes, and prolongs his incision for about two inches towards the umbilicus in the median line. This should be carried down to the intermuscular interval which is to be opened. On this being accomplished, the index finger should hook up the tissues above the upper portion of this dissection, so as to draw the peritonæal reflection towards the umbilicus. I have in this way seldom seen the peritonæum, or even been conscious of its existence. There is generally some fat and cellular tissue between the muscle and the bladder, which can be scraped away with the finger, when the anterior surface of the bladder will be seen. Care should be taken to avoid or to tie any large veins that may be met with, as they sometimes bleed freely, and have been known in elderly persons to cause secondary hæmorrhage. It is a good plan to pass a handled needle, with a stout silk thread, through the bladder wall before it is opened with the knife, so as to secure it. The knife should be inserted into the bladder in the median line, and the incision made in an upward direction, so as to admit the index finger; when this is accomplished it can be readily extended according to circumstances. I prefer holding the bladder wound open by a stout silk suture on either side rather than by forceps. The latter are more likely to cause a rough cicatrix afterwards, which is a matter of importance. I have seen a little trouble arise by the surgeon merely puncturing the bladder with his knife, thus allowing the water to escape and the viscus to become abso-

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* *Edinburgh Medical Journal*, October, 1878.

† *Archiv. für Chir. Chirurg.*, vol. xxv., 1883.

‡ *The Supra-pubic Operation of Opening the Bladder.* Churchill, 1886.

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* Dr. Cruise, *New York Medical Record*, Aug. 1, 1881.

† *British Medical Journal*, Oct. 19, 1889.

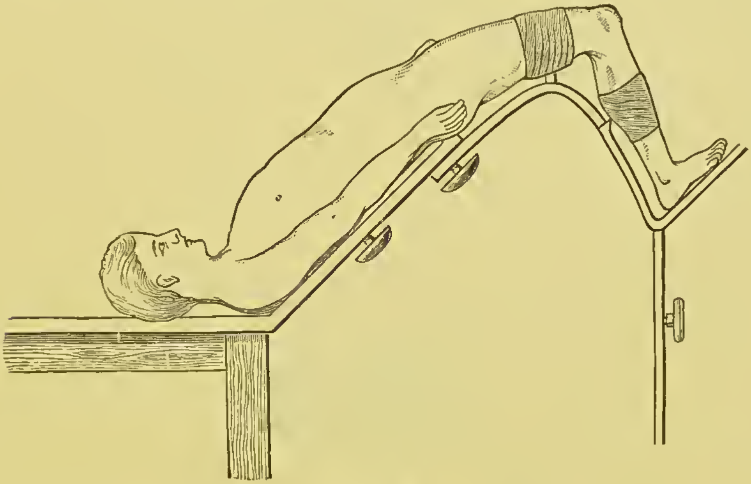

Fig. 126.

lutely flaccid. Where, for this reason, there is difficulty in finding the wound again, as is sometimes the case, a metal bulbous-ended bougie should be passed into the bladder, when the opening is readily discovered.

When it is desirable to open the bladder by a transverse incision, the opening should be made immediately above, and parallel with, the line of the pubes, which involves the division of some portion of the tendons of the recti muscles. Trendelenburg recommends that by means of temporary sutures the mucous membrane of the bladder should be connected with the skin, as shown in the figure from Albarran (Fig. 127). This incision affords a greater area of surface for doing what is necessary, and is recommended in some cases of tubercular ulceration of the bladder requiring local treatment, for plastic operations, for removing extensive growths,

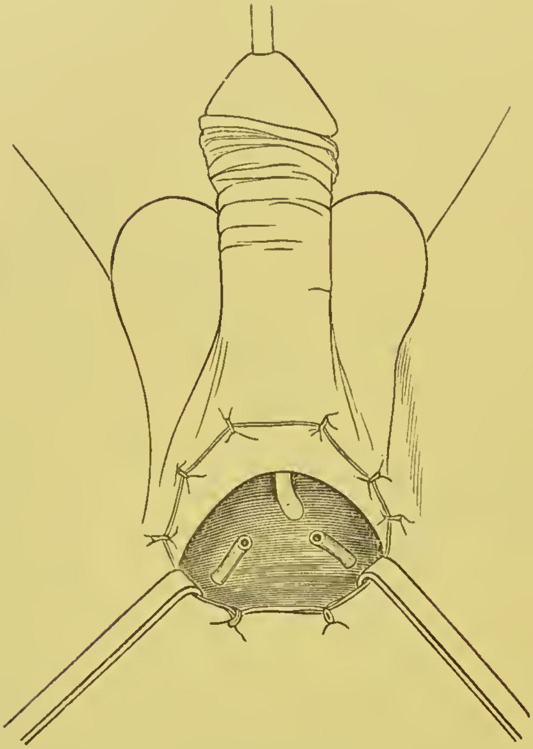

Fig. 127.

and for the direct inspection and manipulation of the orifice of the ureters. I have never had occasion to adopt it, except to a limited extent in conjunction with the ordinary median incision, as first described. It is stated that the transverse incision is more liable to be followed by a ventral hernia than the latter.

The bladder having been opened I will now notice the variations necessary in accordance with the different requirements and the subsequent management of the wound. If there is a stone it is usually at once felt with the finger, when it can be withdrawn with a pair of straight or curved forceps. Care should be taken not to damage the sides of the wound. Should there be a growth or prostatic enlargement encroaching on the interior of the bladder, it can generally be felt by the finger. It can also be inspected by opaque glass or vulcanite specula of different sizes introduced through the wound as described by Mr. Hurry Fenwick,* in conjunction with the reflection from the electric light. The latter plan is an excellent one, not only so far as seeing the growth is concerned, but also in assisting materially towards its removal. For keeping the bladder open to inspection, and at the same time occupying very little room, if the viscus is of fair capacity, Watson's wire speculum (Fig. 128) will be found very useful. Various kinds of forceps for twisting off pieces of growth should be at hand, as shown in Fig. 129. This, I believe, is the best method of removing masses of hypertrophied prostate or other growths. Some scoops and an enucleator hook (Fig. 132) should also be in readiness. Watson's electric clamp cautery (Fig. 130) will be found of service. In this way, and by other modifications which will occur to the practical surgeon, intra-vesical growths may be removed with a preciseness which previous to the introduction of supra-pubic cystotomy, the use of specula, and proper forceps and light, was

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* *British Medical Journal*, Nov. 19, 1892.

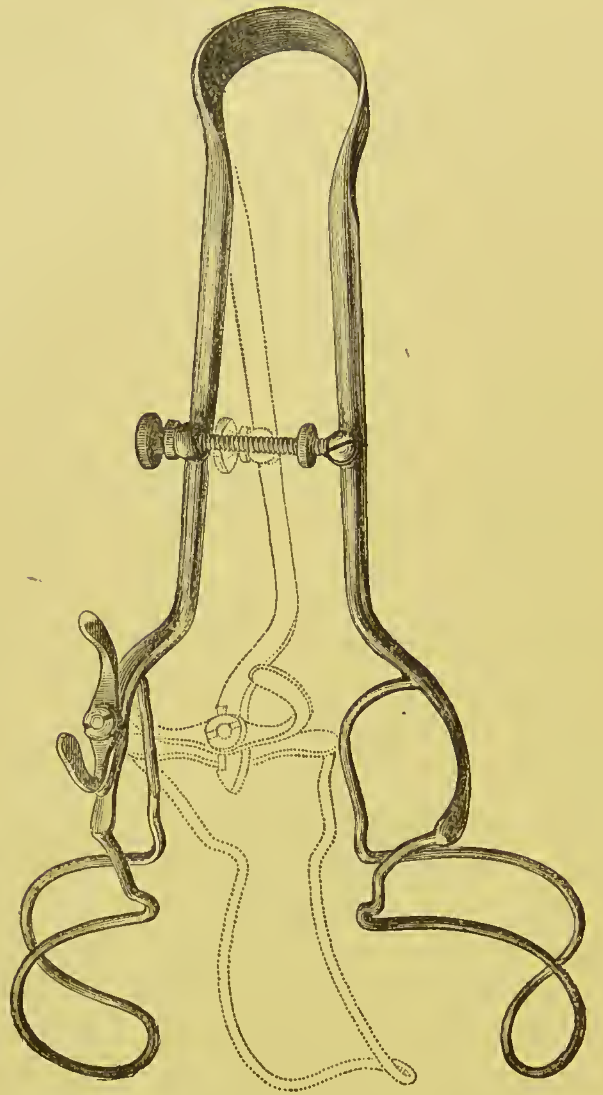

Fig. 128.

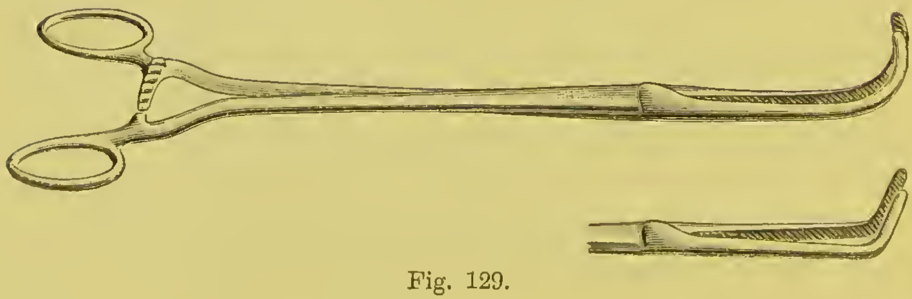

Fig. 129.

generally unattainable. Where there is bleeding the vessels may readily be touched with some styptic, such as iron, turpentine, or the wires of a galvanic cautery; whereas if the oozing is general the surface may be exposed to the action of hot water and hazeline injected through the wound. When drainage alone is required supra-pubic cystotomy has been resorted to with much advantage.

Mr. Lawson Tait * has recently described a method of operating by a process of drawing up the bladder, which he describes as simple and safe. From some experience of supra-pubic cystotomy under almost all conditions for which it is applicable, I think the less we alter the relations of the bladder in removing anything from its interior the better. There is no necessity either for pushing it up from the pelvic outlet or disconnecting it from its peritonæal

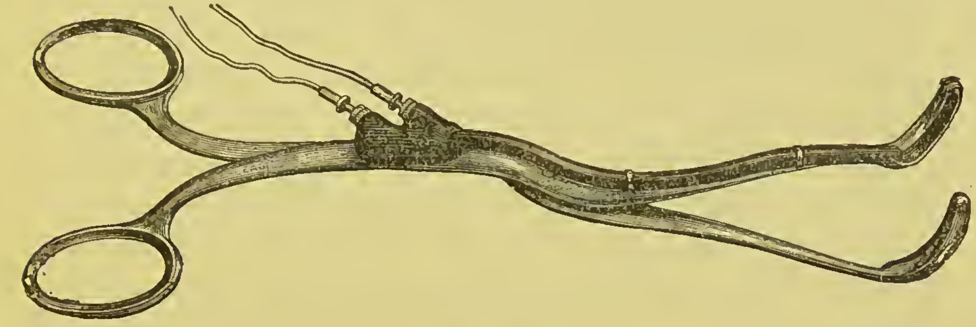

Fig. 130.

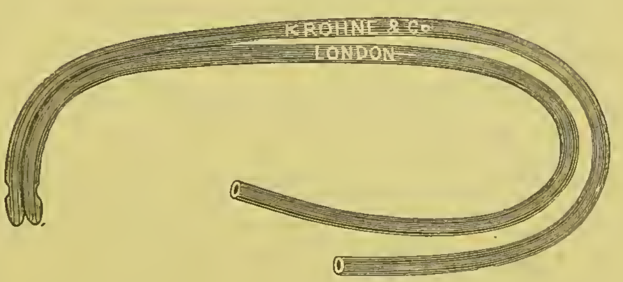

Fig. 131.

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* *Lancet*, May 27, 1893.

attachments, and I have never found the least difficulty in opening it either for stone or tumour in the way mentioned.

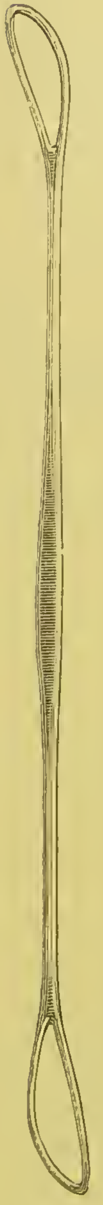
Fig. 132.

The object of cystotomy having been accomplished, the question arises as to what is best to be done to secure the rapid healing of the wound, should this be required. Cases have been recorded where the suturing of the bladder and superficial wound has been followed by primary union, but they are rare; on the other hand, instances are narrated where not only have these attempts failed but inflammation has followed by the confinement of urine in the prevesical space. My belief is, as matters stand at present, that a medium course is best. With this object I leave the bladder opening alone and close the superficial wound to some extent, but allowing space for the use of what is generally known as Guyon's double drainage-tube (Fig. 131). This is really two rubber catheters connected together, which give access either way both to antiseptic lotions or urine, the latter being received in a bottle by the patient's side. The dressing is then completed by gauze, wood-wool pads, and an abdominal many-tailed bandage. If for any reason I was disposed to attempt to obtain primary union by complete suture of the bladder and superficial wound, I should put into the bladder a perinæal drainage-tube as described in the Eighth Lecture. One word in connection with the use of bladder sutures in these and similar operations; if they are put in, care should be taken that they are completely removed. I have known two instances where these bodies gave much trouble subsequently in causing cystitis and the deposit of a phosphatic stone. Mr. Jordan Lloyd records an instance where a calculus formed upon a nucleus of this nature was expelled spontaneously *per urethram.*[*] If an attempt is made to close the bladder wound by sutures with the object of obtaining primary union, the accuracy of approximation should be tested by the injection of water into the viscus.

The following case is recorded by Mr. Bond,[†] who remarks:—

Case.—The patient, a very stout man, of 48 years of age, was operated upon by the supra-pubic method, and a uric acid stone, measuring 1½ by 1¼ inch, was easily removed. The bladder wound was closed with sutures, and on the fourth day, in spite of some urine having been driven out by the violent contraction of the bladder, the wound was healed. In settling the important question, whether after supra-pubic lithotomy the bladder wound should be left open and a tube placed in the bladder, or whether it should be sutured and primary union attempted, I think the condition of the urine may be a guide; if that be healthy, other things being equal, primary union will probably result after careful suturing; it seems better to pass a catheter frequently than to leave one in the bladder.

In cases where there has been difficulty in removing a large stone through the supra-pubic incision, much damage to the bladder from ineffectual attempts to extract might have been averted by making, in addition, an incision as for median cystotomy, by which the position of the stone could be altered with the finger from the perinæal wound, whilst the forceps were applied through the supra-pubic opening. As bearing upon this practice, I will quote from a case of lateral and supra-pubic lithotomy recorded by Dr. A. Paterson.[‡]

Case.—The lateral incision having been made, "on introducing my finger, I at once expressed a doubt as to the possibility of safely removing the stone by this incision, due not so much to the size of the stone, though large, as to the extraordinary sharp spicular surface which it presented. The original wound was cautiously enlarged by means of a probe-pointed bistoury, but the inevitable extensive laceration and bruising which must have attended removal induced me to desist from any further attempt to extract it in that situation. An incision in the median line was now made, three inches in length, just above the pubes, and by careful dissection the reflection of the peritonæum was exposed and held back; then the upper part of the anterior wall of the bladder was divided, and the stone easily grasped by the forceps. The greatest difficulty was experienced here, and it was only after introducing a scoop, and levering it, that the stone was at length extracted. The extraction was assisted by a finger placed in the rectum supporting the calculus. The edges of the supra-pubic wound were brought together, and a drainage-tube inserted."

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[*] *Birmingham Medical Record*, April, 1892.

[†] *Lancet*, Feb. 5, 1887.

[‡] *Glasgow Medical Journal*, April, 1882.

The thorough manner in which the double wound permitted drainage to be carried out—a point of considerable importance in the after-treatment of lithotomies where very large stones have made beds for themselves—no doubt contributed to the successful issue of this case. Seventeen days after the operation the patient was well, passing all his urine through the natural channel. The calculus measured six inches in its long circumference, and five and a half inches in its short.

In reference to making two openings into the bladder to meet special circumstances, I quote the following passage from a recent author:* "It is said of Frère Côme (1758–1778), whose high operations for stone were so successful, that in order to prevent urinary infiltration he was in the habit before performing epicystotomy of opening the urethra in the perinæum. The value of perinæal drainage was also appreciated by Civiale, who, according to Bransby Cooper

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**A Study of Tumours of the Bladder*, by Dr. A. W. Stein, New York, 1881.

(Coulson, p. 475), while engaged in the high operation for stone, accidentally wounded the peritonæum, and, fearing extravasation of urine into the peritonæal cavity, opened the bladder through the perinæum, and the patient recovered."

Dr. Howe* records a case where he thus successfully removed a stone from the bladder weighing 3,541 grains.

Case.—The patient was only sixteen years of age. A supra-pubic and a perinæal incision were made, through the former of which the stone was extracted, great assistance at the same time being rendered by the index finger passed into the bladder through the perinæal opening. Dr. Howe observes: "From a careful study of this case, and from an examination of the records of the extraction of large calculi through the perinæum and rectum, I am convinced that the supra-pubic operation is the only safe one. The stone can be removed without lacerating important organs. Free drainage can be kept up through a perinæal opening, as well as through the lower extremity of the abdominal incision, thus reducing to a minimum the danger arising from urinary infiltration and peritonitis."

Dr. William Gardner,† of Melbourne, records the case of an adult male, where, on finding from a lateral perinæal incision that the stone was too large for removal in this way, he added a supra-pubic incision, elevating the bladder by a Barnes's bag containing eight ounces of water introduced into the rectum. A curved sound was then passed in through the perinæal wound, and on the turned-up beak the bladder was incised and the sides grasped with forceps. The lateral incision rendered service in permitting the exploration of a large rough oxalate stone, in favouring its extraction above the pubes, and in providing a dependent channel for drainage. The stone weighed over six ounces, and the patient recovered well from the operation.

It will thus be seen that supra-pubic cystotomy has proved of much value in the treatment of stones where the operator was of opinion that they were too large for removal by crushing or in any other way. It is impossible to define by measurements what is meant by a very large stone. The term must be regarded somewhat as a relative one, in which the experience of the operator, the state of the urethra, the size of the prostate, and the condition of the bladder have to be taken into consideration. An ounce and a half stone, for instance, complicated with an obstructive prostate, might, in the opinion of the operator, require a supra-pubic opening; whereas, if it had not been so complicated, a calculus twice this size, or even larger, could be dealt with by crushing. Again, the probable composition of the stone, whether a hard or a soft one, will influence the decision of the surgeon. In the same manner a conclusion may be arrived at in the case of male children; the size and nature of the calculus, coupled with the practitioner's own experience in these operations, will determine whether crushing or cutting should be undertaken.

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* *New York Medical Journal*, Feb. 17, 1883.

† *Australasian Medical Gazette*, Sydney, December, 1886.

Sacculated stones, or the possibility of such a condition, would point to the selection of the high operation. Mr. Vincent Jackson* reports an apt illustration bearing upon this point, where supra-pubic lithotomy was successfully performed for the removal of a lithic acid calculus, weighing over fifty grains, which was fixed in a sacculus at the base of the bladder. Removal had previously been attempted by perinæal lithotomy.

Where stone in the bladder is complicated with an enlarged prostate, and the patient is more or less dependent on the catheter by reason of atony, there are good grounds for the selection of supra-pubic cystotomy. By this means not only may the stone as well as the obstruction be removed, but the function of the bladder restored. It is in cases of this kind, where the patient is, or becomes, absolutely dependent on the use of the catheter after lithotrity, that calculous recurrence so frequently takes place. There can be no doubt that a complete power of contraction and evacuation is an important consideration in the selection of lithotrity. When performing supra-pubic cystotomy it is well to see that the external meatus of the urethra is not unnaturally limited, and if this is the case it should be divided. I have known an instance where such an obstruction retarded the healing of the supra-pubic incision, in the same way that a urethral stricture does, and where before the wound healed it was necessary to divide the meatus with some freedom.

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* *British Medical Journal*, Feb. 18, 1888.

Instances are occasionally met with where, for some reasons, the supra-pubic opening does not close as rapidly as could be desired, and a more or less troublesome fistula results. It may merely be a case of delay, where healing can be promoted by the use of nitrate of silver, the wire of the cautery, or even the simple expedient, if the hole is a small one, of requiring the patient to exercise firm pressure over it with the finger each time urine is voluntarily passed. The retention of a soft catheter in the urethra for a few days or the frequent passing of a catheter are also expedients which have proved successful. In two instances where the fistula looked as if it was going to be permanent I passed a grooved staff into the bladder, punctured the membranous urethra, and put a drainage-tube into the bladder as described in the Eighth Lecture. By incontinently and continuously draining the urine in this way for some days, the fistula healed, as did subsequently the perinæal puncture on the withdrawal of the drainage-tube. This plan has also been adopted as a primary part of the operation for supra-pubic cystotomy. The drainage thus provided has enabled the surgeon to close the anterior wound by superficial and deep sutures, and primary union has in this way been obtained.

The supra-pubic operation has been used in cases of stone in women with advantage, and also in both sexes for the removal of some calculi, formed on such irregular foreign bodies as hair-pins and wires which have been introduced into the urethra. Under the latter circumstances, lithotrity would be out of the question, as such attempts to extract, after breaking down the phosphatic mass covering them, have been attended with serious and fatal consequences. By a supra-pubic incision less difficulty and risk may be anticipated, as should it be necessary the nucleus may be divided by a pair of cutting pliers or bone forceps. The bladder can in women be kept moderately distended with water by the pressure of a finger on the line of the urethra until it is opened from the front. The high operation has been utilised for plastic operations, as in the case of some varieties of vesico-vaginal fistulæ referred to in the Twenty-fourth Lecture.

THIRTY-SECOND LECTURE.

THE RECURRENCE OF STONE IN THE BLADDER AFTER OPERATION.

I WILL now pass on to consider one of the most important points in connection with the history of stone in the bladder; I refer more particularly to those instances where recurrence takes place after operation. It will be remembered by those who have watched the course events have taken, more especially in connection with the removal of stone by crushing, that though this operation had made considerable progress in many of its details, a few years ago the views of surgeons were by no means unanimous as to its great superiority over lithotomy, except in the case of comparatively small stones in bladders that were not otherwise disordered. In a discussion[*] which took place about the time when the old method of operating by numerous sittings was giving place to Bigelow's procedure, it was evident that lithotrity was not growing in favour. This was due not to any excessive mortality, or to any special difficulties connected with the operation, but to the fact that, even in the most competent hands, it failed in a considerable proportion of instances to give immunity from recurrence. Nor was there any desire to exaggerate this fact, for, as Sir James Paget observed in the discussion referred to, the proportion of relapses would have been considerably increased if the period of probation subsequent to the operation had been extended from a few weeks to at least a year. Speaking on the same occasion,

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[*] *Trans. of Med.-Chir. Society*, 1878.

Mr. Cadge remarked to the effect that it would be necessary to include the results of lithotrity under three headings, namely, those persons who were cured, those who died, and those who did not eventually recover. It was hoped that the new method of operating, which was then coming into vogue, by securing a more rapid and complete evacuation of all fragments from the bladder, would materially mitigate this acknowledged defect. Turning to the address of Mr. Cadge (1886), one of my predecessors in the Hunterian Chair at the Royal College of Surgeons, which was delivered seven years after Bigelow's operation had been introduced, and after a fair trial of the new operation in a sphere presenting almost unique opportunities for observation, we find he referred to this point in the following words: "Although the immediate and direct mortality of lithotrity is small, the recurrence of stone is lamentably frequent. In my own list of 133 cases there were 18 in which recurrences one or more times took place, being about one in seven. Sir Henry Thompson, with a much larger number of cases, gives about the same proportion. I am disposed, however, to infer that recurrence is more frequent than this."

I am not aware that the accuracy of this statement has been challenged or that anything has since arisen to question its application to what now exists. If my own experience had not furnished me with a text I should have found it in these weighty testimonies. In proceeding to consider the circumstances under which these recurrences take place, I need hardly observe it is not with any intention of disparaging lithotrity or of upholding lithotomy, but with the object of finding a remedy for defects which cannot fail to be admitted by a candid observer. The due recognition of the considerable mortality that formerly prevailed, and its probable cause, doubtless led Bigelow in the direction of making such improvements as almost entirely to remove at one sweep the chief risk connected with the performance of lithotrity.

From a lay point of view the recurrence of stone after it has once been supposed to be removed is usually regarded as evidence that the operation performed was in some way or other defective. This conclusion is based on an idea that a calculus in the bladder always bears some resemblance to a stone in a box, and that consequently the conditions associated with its removal are of a mechanical and constant nature. A slight acquaintance with the circumstances attendant upon operations for stone, combined with a knowledge of the pathological changes the bladder often undergoes, is sufficient to show that such a simile is of limited application, and that other conditions often coexist which are not sufficiently taken into account. The contrast between the ideal (Fig. 133) and the real bladder (Fig. 134) containing a stone may, without exaggeration, in some elderly persons, be approximately shown in the sketches I have drawn. These may also be useful in indicating some of the different circumstances under which washing out of the bladder has to be undertaken. There are at least three forms or states under which recurrence takes place: (1) as connected with an imperfect removal, where portions of, or even whole stones, are left behind;

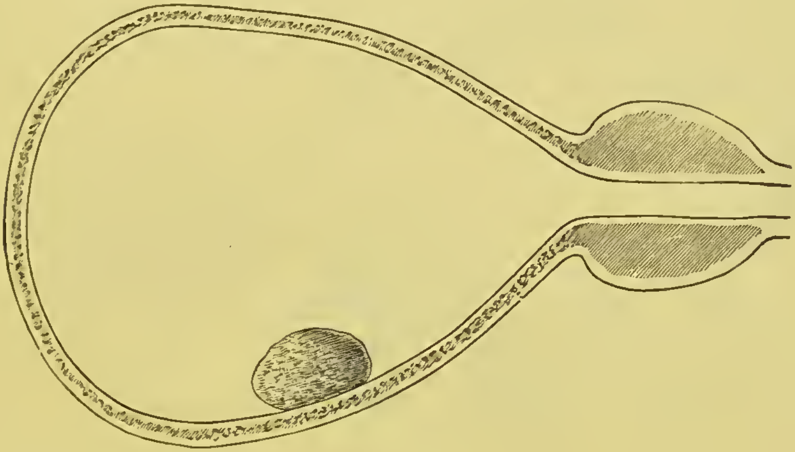

Fig. 133.

(2) the persistence of conditions favourable to the production of stone which are in no way influenced by the mere removal from the bladder of what has already been produced; and (3) the development of conditions favourable to the production of stone—conditions which had no existence prior to the removal of the original calculus. It will be necessary to expand and illustrate these several headings.

(1) That imperfect removal is an antecedent of recurrence both in lithotomy and lithotrity, rare with the former and more frequent with the latter, is a fact which is generally admitted. Putting aside those instances which may be due to somewhat hasty and imperfect methods of examination at the time of operation, I will proceed to notice some of the conditions where exceptional obstacles to complete removal are interposed, which may thus be regarded as contributing causes of recurrence. These will be found to have reference to the shape of the bladder or the prostate, rather than to anything connected with the size or the form of the stone. Where a stone lies in a normally disposed bladder the probabilities of any recurrence after removal taking place are extremely remote; for if the operator was to succeed in removing everything but the smallest particles, the local

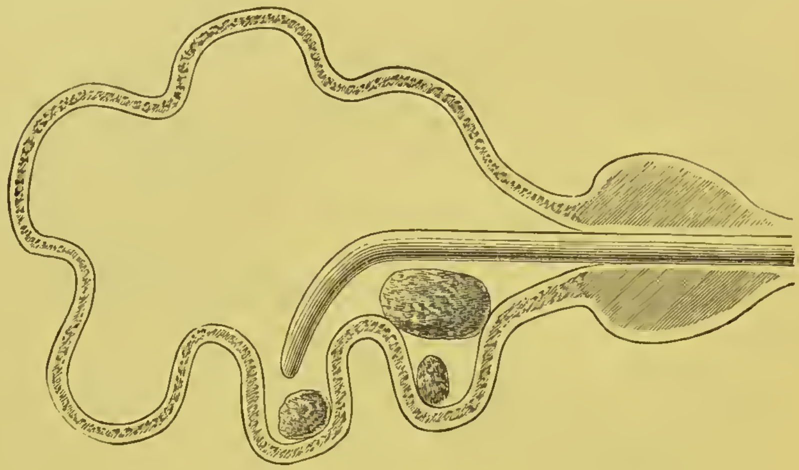

Fig. 134.

conditions are such as almost to ensure their spontaneous discharge. The success of lithotomy in early life, and the gradual increase in the number of recurrences as age advances, coincident with alterations in the shape of the prostate and the posterior wall of the bladder, afford evidence of this. These contributing alterations in the shape of the viscus, as forming traps for stone or fragments, may briefly be referred to.

Reference to Figs. 109 and 110 will be sufficient to indicate more forcibly than by words the obstacles that are placed in the way of the operator endeavouring to remove all obvious traces of stone from the bladder when it happens under conditions of pouching (Fig. 109) or of sacculation (Fig. 110) as are there shown. Nor is the state less unfavourable, as shown in Fig. 51, where a large pouch capable of holding several ounces of fluid has apparently undermined an enlarged prostate. In a less striking degree the latter form is not unfrequently met with, I have noticed, in the bladders of elderly men with prostatic enlargement. In some instances it seems to have originated and been extended by the retention of increasing quantities of residual and unexpelled urine. Where it happens in patients who are the subjects of stone requiring treatment by crushing, it forms a serious obstacle to the withdrawal of the smaller fragments. When the great bulk of the stone is in this way removed, as the bridge of tissue is pressed downwards by the force or weight of the aspirator catheter, fragments are thus absolutely locked in. In this way it may be impossible to dislodge the *débris* from this position until the catheter is removed, when they will sometimes float out and be subsequently spontaneously evacuated, to the annoyance of the operator, who may have flattered himself that everything has been got rid of. Such formations of the bladder may show themselves in this way. A stone in the mouth of a pouch or a sacculus may sometimes act as a cork (Fig. 134), and permit, after its removal by the lithotrite, of the escape of a second stone into the general cavity of the bladder by either muscular action or accidental extrusion. This, I believe, happened in a case where I removed a calculus from an apparently healthy bladder in a young adult male. Shortly after this was done, symptoms of stone, without any evidence of renal colic, suddenly returned, and another calculus was removed by a supra-pubic operation. At the time of the first operation I satisfied myself, as far as it was possible, that the bladder was clear, and I had no reason to suspect otherwise. Again it has occurred that a flat shell of calculus after lithotomy has remained concealed under a projecting bar of prostatic tissue, as shown in Fig. 51. After the operation it has made its escape from beneath this bridge of tissue, and then getting on its edge has excited symptoms of most acute irritation. This has been the more pronounced when the mischief has occurred in a bladder which is more or less dependent on the use of the catheter. Such abnormalities of the bladder explain obstacles in the way of complete evacuation which, though we may be cognisant of them, are difficult to provide against. In addition, however, to pouches of this distinct nature where the prostate is much enlarged, the posterior wall of the bladder often presents irregularities (Fig. 52) into which, when circumstances are favourable, phosphatic calculi are moulded, not unlike what occurs on a much smaller scale on the surface inequalities connected with the teeth. Though sacculation (Fig. 110) of the bladder is of the nature of a hernial protrusion of the mucous membrane, and may originate in strains and lesions involving the bladder, whilst pouching (Fig. 109) is a partial subsidence of a dependent portion of the whole thickness of the bladder wall arising out of some obstruction in front, there are grounds for believing that alterations in shape of this nature may be connected with developmental processes. This was pointed out and illustrated by Mr. Targett[*] in his lectures, and is a matter of some importance in connection with the recurrence of stone in early life, when no urethral or prostatic obstruction can be said to exist. Stress is laid upon points such as these, as sufficient prominence has not, I believe, hitherto been given to them as affording important links in connection with the relapse of stone.

(2) Proceeding to the second heading, I have observed that the mere removal of a stone from the bladder by a mechanical process in no way implies that the conditions which led to the primary formation have necessarily been altered or interfered with. Take, for instance, those more obvious illustrations of stone formation which are sometimes seen in persons with paralysed bladders, as from fracture of the spine, where a series of these concretions forms with remarkable rapidity, or in gouty subjects who excrete large quantities of lithic acid crystals. In the former case, so long as you have alkaline urine and shreds of cast-off tissue, you have all the conditions necessary for the production of phosphatic stones *ad infinitum*. So with the concretions of uric acid which primarily form as renal calculi in the tubular portions of the kidney. While there is a supply of these in conjunction with their necessary crystalline deposit, the process of stone formation may readily be repeated, and as age proceeds and the prostate enlarges a condition is superadded favourable to the collection and concretion of lithic acid which did not previously exist. Hence I believe the greater frequency of stone at advanced periods of life is accounted for, not only for the reason that the facilities for making lithic acid are frequently increased, but because the latter is often discharged from the urinary apparatus under circumstances of greater difficulty. If a person, for instance, has a stone in his bladder and also others in his kidney, or in

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[*] *Pathology of Tumours connected with the Bladder.* Royal College of Surgeons, 1893.

course of formation there, whilst concurrently he has developed an enlarged prostate, or is doing so, I think he may consider himself fortunate if he escape without the necessity for having a second stone removed from the bladder. Some years ago I cut a man for stone; just as he was about to leave the hospital he had a most acute attack of renal colic, with hæmaturia, and passed a uric acid calculus almost as large as an ordinary marble. Had this stone remained in the bladder it would probably have grown by the aggregation of phosphates upon it. It will be seen how easily I might at a later date have been exposed to the charge of having left a stone in the bladder at the previous operation. Similar illustrations of this kind of recurrence, quite independent of the selection of the operation or the manner of its performance, might easily be furnished.

(3) In the last place reference may be made to the development of conditions favourable to the production of stone which had no existence prior to the removal of the original calculus. That such is probable is indicated from what was referred to in the Twenty-seventh Lecture, where illustrations were given of changes in the composition of the calculus where recurrence took place. The following is another example of this kind :—

Case.—A gentleman about sixty, of a gouty habit, consulted me. I detected a moderate sized uric acid calculus lying behind his large prostate, which I removed by crushing. When collected the fragments were entirely composed of urates with no phosphates. After some months, his large prostate began to trouble him for the first time. He found he could not empty his bladder completely, and this gave rise to more or less catarrh. Three years after the removal of the uric acid calculus he came to me again, when I found he had two stones of moderate size. These I also removed by crushing. On examination, unlike the previous calculus, they were entirely made of triple phosphates, and did not contain one particle of urates in their composition.

The mode in which triple-phosphatic stone, as the recurring type of calculus, is produced is a subject of considerable interest. In a paper * relating to it Mr. Cadge evidently seems to connect the frequency of stone recurrence with the difficulty of ensuring that every portion of the primary formation is removed from the bladder. On the other hand, he believes that structural lesions, such as those observed in connection with lithotomy, are capable of providing a nucleus on which phosphates may be deposited, in the same way as upon a nucleus of stone, provided the state of the urine admits of this. I venture to think that perhaps he somewhat under-estimates the frequency with which lesions of this nature come into play in connection with lithotrity. Where the bladder is much pouched, as is the case with stones complicated with an enlarged prostate, though the bulk of the urine may be acid the contents of the sacs are often both alkaline and ammoniacal, as may be frequently noticed in cases where a residuum of urine always remains. Further, as I pointed out in my Hunterian Lectures, we do not attach sufficient importance to the influence that has been exercised on the bladder wall partly by the presence of the stone and partly by the protracted means that are sometimes necessary for the removal of the calculus by a crushing operation. A rough or uneven cicatrix or scar, as Mr. Cadge refers to in his paper, is not always the best substitute for a natural mucous membrane. A case in point is referred to on page 430. I have often been struck with the appearance presented by the urine at varying intervals after the stone has been taken away. Masses of flocculent matter are thrown off sometimes for weeks, which are as capable of furnishing a nucleus for phosphates as a feather, a villous growth, or a rugose bladder. It may be objected that such arguments would apply with equal if not greater force to lithotomy

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* "The Vesical Origin of Urinary Calculus," *Trans. of Norwich Medico-Chirurgical Society*, 1870.

where the proportion of stone recurrence is considerably less. On the other hand, I would reply that the involuntary urine drainage the latter operation entails is as salutary to the inflamed, or excoriated, or distorted bladder as it often is to a chronic abscess; and further, that the selection of lithotrity by no means implies that less damage to the interior of the bladder is necessarily done by this process. I have examined some cases after death where lithotomy had previously been practised, at various periods of time, without being able to discover any internal trace of the procedure. Can we say the same of some cases of lithotrity where hæmorrhage has been considerable both at the time and after the operation?

Because urine may be comparatively stagnant or quiescent in a saccule or pouch connected with a bladder which in other respects is healthy, it does not follow that the conditions going on within the sac are the same as when a stone is removed from such an organ by a more or less protracted, and not necessarily innocuous, proceeding. In debating this point, Mr. Cadge shows that alkaline and offensive urine holding thick mucous in excess is not sufficient to lead to the formation of phosphatic stone, by reference to the common instances where this constantly exists in connection with some forms of prostatic hypertrophy. What, however, may I ask, would be the effect of adding to these conditions favourable to the formation of a phosphatic stone, another one in the shape of constant contact with a more or less rough cicatrix, not to say anything of the presence in the urine of certain material products of inflammation capable of being demonstrated? It appears to me that there is sufficient evidence to indicate what is almost sure to follow. From the foregoing observations some practical conclusions may be drawn under the several headings.

(1) In the conduct of all operations for the removal of stone from the bladder every care should be taken to render

the process a complete one. The impossibility of doing so by one method, either proved or rendered probable, would necessitate the selection of another. The recurrence of stone after lithotrity may indicate the propriety of an ocular or digital exploration of the bladder by some method, such, for instance, as perinæal lithotrity, where the bladder and its recesses may not only be more effectually cleared of all stone and fragments, but where the viscus may be submitted, in addition, to a process of drainage. The shape of some bladders, as consequent on obstructive, mechanical, or developmental changes, is such as to render the removal of all particles almost impossible. On the other hand, where the bladder is healthy, or approximately so, the success of lithotrity can almost now be absolutely guaranteed.

(2) As the mechanical removal of a stone from the bladder does not necessarily imply that the conditions which led to its production cease to exist with the completion of the operation, states favourable to reproduction—as, for instance, in the case of diathetic stones, such as the urates, oxalates, and even, it may be presumed, the cystin—should be carefully watched. Persons in the habit of excreting large amounts of uric acid in a crystalline form, or in the shape of renal calculi, are placed at a considerable disadvantage when the prostate commences to impede micturition and to render certain parts of the bladder dependent. Under such conditions important alterations in the amount and form of crystalline excretions may be effected by means of diet, exercise, and suitable waters. On manifestations of the diathesis continuing after the removal of uric acid calculi from the bladder, I have seen excellent effects follow the use of the Contrexeville waters in combination with other means to which reference has already been made. In some cases this seems to have been attributable to changes in the form of the excreted crystals thus artificially brought about.

(3) In the last place, much may often be done to prevent the development of conditions favourable to the reproduction of stone in some form, after its removal. This has reference more particularly to those changes in the parts which are favourable to the formation of calculi or concretions consisting more or less of triple phosphates. The urine of patients, after lithotrity especially, should be watched for some time, until, in fact, all traces, physical as well as chemical, which may be regarded as favouring such a tendency, have ceased to continue. Unless this can be brought about, the liability to recurrence must be said to exist. Urine that still contains shreds and particles of inflammatory exudation, or which is alkaline or ammoniacal, may be regarded as containing factors necessary for the formation of triple-phosphatic stones. When such conditions are constantly in existence, the completion of the process of stone formation is often only a matter of time which some mere accidental circumstance, in furnishing what is required, may determine. By local and general means, as referred to in the Twenty-third Lecture, these conditions may be prevented. In addition to these measures, benefit will often be derived, in bringing about a more natural condition of the mucous membrane of the bladder, as well as the urinary tract generally, by the sulphur springs of Harrogate or Strathpeffer in Great Britain, or the ferruginous waters of Wildungen in Germany.

Reference has already been incidentally made to a paper by Sir William Roberts (p. 383), where it is proposed to make the lactic fermentation predominate over the ammoniacal, with the view of preventing the deposition of triple-phosphate concretions. In some cases immediate and permanent benefit appears to have resulted, though further observation will be necessary for the purpose of establishing the value of the suggestion from a practical point of view. I have endeavoured, in the few instances where this treatment has been tried, to bring this about by first washing out the bladder with tepid water containing from five to ten grains of citric acid to the pint, and then, after the bladder has been cleansed in this way, leaving within it a drachm of extract of malt (Bynin) in an ounce or so of water.

THIRTY-THIRD LECTURE.

THE PATHOLOGY OF TUMOURS OF THE BLADDER, PROSTATE, AND URETHRA.

BEFORE proceeding to consider the operative treatment of tumours of the bladder and prostate, a brief account will be given of their pathology. In the preparation of these remarks, I would take the opportunity of expressing my obligations to Mr. F. T. Paul for the valuable assistance he has rendered me, and for the microscopical specimens used in illustrating these observations.

Tumours of the bladder. The bladder wall is developed partly from hypoblast and partly from mesoblast; consequently, on the embryological theory of the origin of morbid growths, we may expect to find connective tissue, vascular and epithelial tumours. It is interesting to note, in association with papilloma of the bladder, that the allantois, the hypoblast lining of which gives rise to the epithelial coating of the bladder, is also the source of the chorionic villi, the most perfect example of physiological papillary growths. The classification of bladder and prostate tumours adopted here is similar to that proposed by Mr. Paul,* in a paper read before the British Medical Association in 1883. The former will first be considered in the following order:—(1) Myoma; (2) Fibroma; (3) Myxoma; (4) Sarcoma; (5) Papilloma; (6) Carcinoma.

(1) Myoma of the bladder is a very rare growth, met with

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* *British Medical Journal*, Jan. 4, 1884.

chiefly in the form of nodules encapsuled in the submucosa. It is composed of unstriped muscular fibres, resembling uterine or prostatic myoma (Fig. 139). Cases are recorded by Gussenbauer * and Volkmann.† The muscular fibres are sometimes mixed with a good deal of fibrous tissue, when the tumour is called a fibro-myoma.

(2) Fibroma and (3) Myxoma may be regarded as essentially the same, myxoma being merely a fibroma, the cell-substance of which has undergone mucoid transformation. The great majority of these growths, which are by no means common, are polypoid, and the softer varieties approach very closely in structure to that of the denser papillary growths. A true fibroma, however, would originate in the deeper layers of the submucosa or muscular coat, and be covered by the distended but otherwise normal epithelial layer; whereas in a papilloma the essentially epithelial character of the growth is evident (Fig. 136) from the large share taken by the epithelium in its formation. Fibroma and myxoma constitute the majority of so-called bladder polypi. The former occur in adults, and the latter usually in young children, in whom they are probably generally congenital.

(4) Sarcoma of the bladder is less frequent than carcinoma. The round-celled variety is the form in which it usually occurs. Mr. Paul, in the paper before quoted, mentions but one specimen, the same described by Mr. Rodger Williams.‡ This growth occurred in a hernial sacculus of the bladder, and was composed of round and spindle cells. It was believed to be a sarcoma which had inflamed. Two cases of lympho-sarcoma of the bladder have been described by Mr. Eve and Mr. Chaffey,§ and the former in the same communication also gives an account of a mixed or myo-sarcoma occurring in the muscular coat of the bladder.

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* *Archiv. für Klin. Chirurg.*, xviii. † *Ibid.*, xix.

‡ *Path. Soc. Trans.*, vol. xxxiv. p. 152.

§ *Ibid.*, vol. xxxvi. pp. 284, 287.

The lympho-sarcoma is composed of a fine fibrous stroma, the meshes of which are occupied by round cells with large deeply staining nuclei and very scanty cell protoplasm. Sarcomas of the bladder may be very small, scarcely showing on the surface, or, as in Mr. Eve's case, they may form large masses projecting into and partly filling the bladder; the surface may be ulcerated, but is apparently, unlike carcinoma, never villous.

(5) Papilloma. As the mucous membrane of the bladder is destitute of papillæ, the term papilloma, as applied to innocent villous growths of this viscus, has been objected to, many pathologists holding with Virchow[*] that they should be termed vascular papillomatous fibroma. As the papillary outgrowths are, however, clothed by a very thick layer of epithelium, and as it can be seen, as was first pointed out by Rindfleisch,[†] that in the more delicate of the villous tufts the basement membrane of the epithelium rests on the wall of the blood-vessel without the intervention of any fibrous tissue, it may be said that, although many villous tumours partake to a greater or less extent of the characters of a papillation of a fibrous growth, they are mostly best described as true papilloma; and in this connection it is well to recollect, as already mentioned, that the extra abdominal portion of the allantois which forms the chorion is normally provided with papillæ, hence it is not an unlikely occurrence for them to be met with in the bladder (the intra-abdominal portion of the allantois) as a pathological occurrence.

Papilloma or villous tumour (sometimes incorrectly called villous cancer of the bladder) is met with chiefly on the trigone and in the neighbourhood of the ureters; in other words, like warty growths in other situations, around the orifices. It is composed of numerous long, filamentous, branching processes, forming a cauliflower-like growth of a variable consistency depending on the amount of connective tissue framework supporting the epithelial growth and vessels. On microscopic examination the processes are seen (Figs. 135 and 136) to be more or less made up of a delicate fibrous stroma, containing thin-walled and wide—sometimes varicose—blood-vessels, and not rarely unstriped muscle cells, the whole forming an upward prolongation of the submucosa, covered with stratified epithelium. The growth does not extend into the deeper layers of the mucous membrane, and the epithelium everywhere rests on a basement membrane. While the growth retains this structure it is in no sense malignant or cancerous, but papilloma here as elsewhere is liable, if not removed, or if recurring after removal, to grow more and more dense and fleshy in character, and ultimately to become a carcinoma. This is well illustrated in a case related by Mr. Paul, where a papilloma

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[*] *Die Krankhaften Geschwülsten*, Bd. iii., Berlin, 1865.

[†] *Pathol. Histol.* English Translation, vol. i. p. 454, edit. 1872.

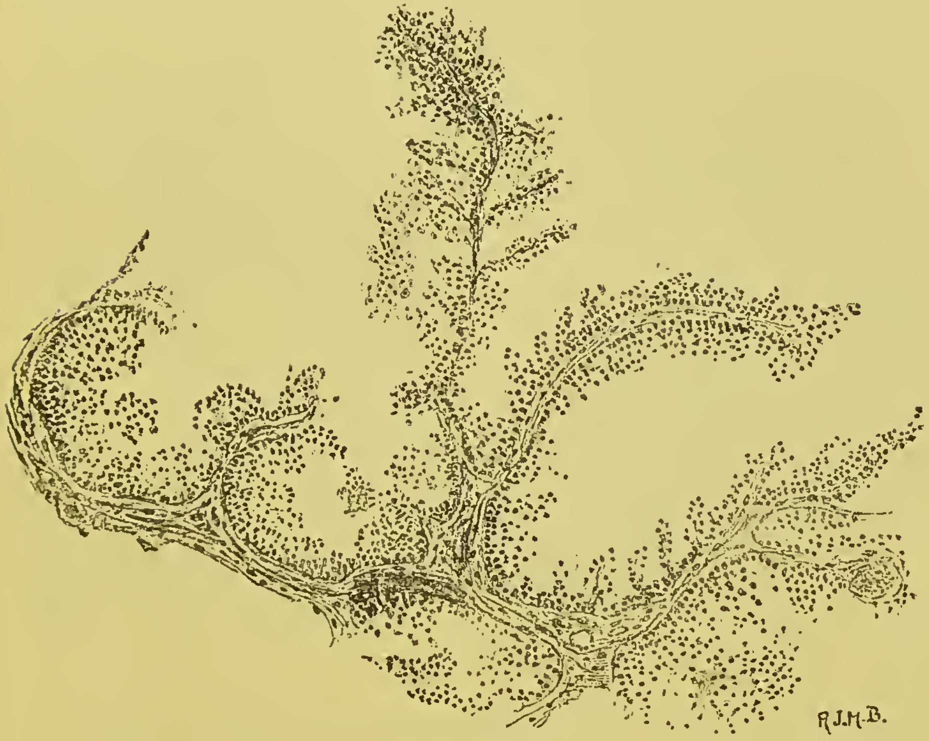

Fig. 135.

which had been removed several times ultimately caused the death of the patient, after ten years of occasional treatment, and the growth was then found to be infiltrating the bladder wall as a carcinoma. It is to be remembered that where a papilloma overlies a carcinomatous growth in the submucous and muscular coats of the bladder, this condition does not necessarily depend on the innocent growth having taken on malignant characters, since it is not very rare to find, as is well shown by Cornil and Reliquet,* that carcinoma may be associated with the development on the overlying surface of a structurally innocent papilloma (see Fig. 147).

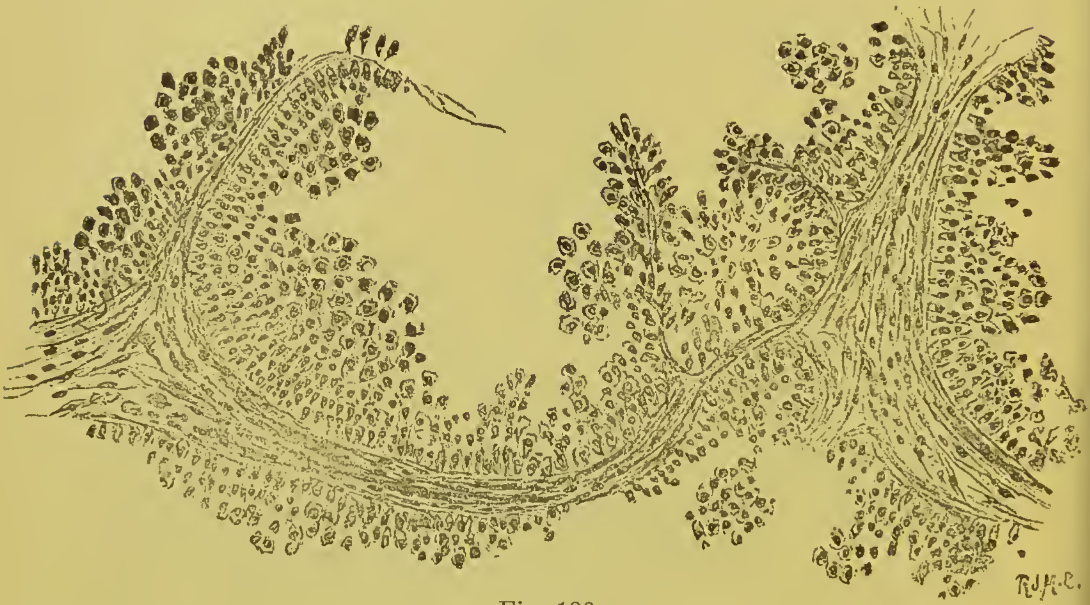

Fig. 136.

The delicate and friable character of villous tumour renders it very liable to injury from the contraction of the bladder in emptying itself, not only by the action of friction and pressure on the growth, but also by the congestion of the capillary loops produced by the contraction of the muscular coat. In this way hæmorrhages are frequent, and death is usually due to anæmia and exhaustion. In other cases the position of the growths around the ureter leads to chronic obstruction of that tube and hydronephrosis. In some instances where the obstruction is more acute, suppurative pyelonephritis may result. The papillomas of the bladder are subdivided into two classes, fimbriated papilloma and fibro-papilloma. In the former the stalk breaks up into numerous delicate branches presenting the well-known villous appearance; in the latter it is compact and sessile, and has a more dense fibrous structure.

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* *Carcinome Villeux Diffus de la Vessie*, par MM. Cornil and Reliquet. Paris, 1886.

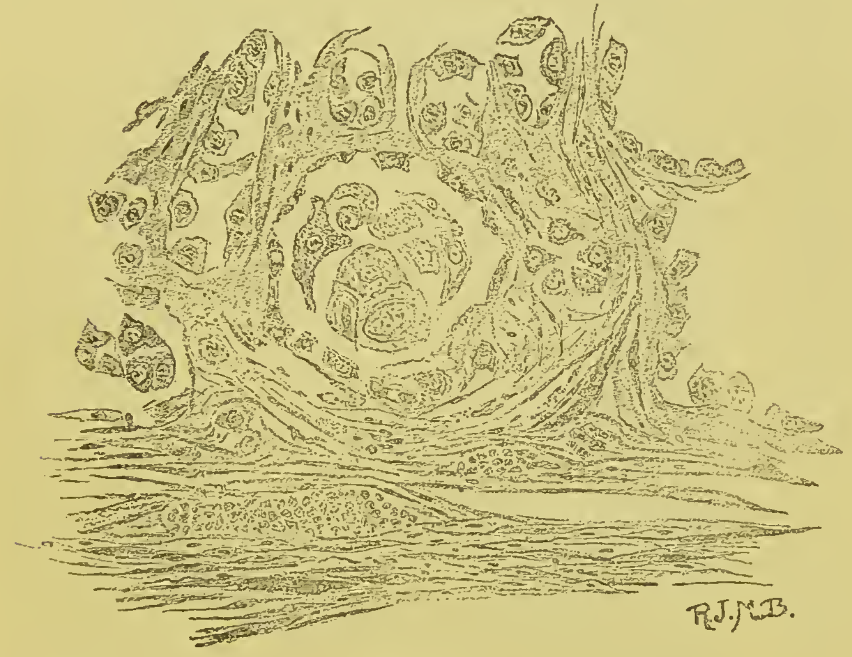

Fig. 137.

(6) Carcinoma. The epithelial lining of the bladder is composed of a single-surface layer of large-sized squamous cells, with underlying pear-shaped and round cell layers. It is also provided with small racemose mucous glands, most numerous near the neck of the bladder. It will be seen that we may thus expect to meet with two varieties of cancer of the bladder: (*a*) epithelioma, or squamous-celled carcinoma (Fig. 137); and (*b*) glandular-celled carcinoma. Speaking

clinically, the former would usually be termed encephaloid cancer, whilst the latter might be encephaloid or scirrhus—in other words, hard or soft. These clinical terms, however, give no information relative to the intimate structure of the tumour, but indicate only its rapidity of growth and probable degree of malignancy. The vesical glands might be liable to innocent adenoma as well as to malignant carcinoma. So far as I know only one case of the former is recorded, viz., a case of papillary adenoma, removed by Kaltenbach* from the bladder of a woman aged 44 years.

Dr. J. H. Neale, of Leicester, records a case † of malignant tumour of the bladder where the account of the microscopical features of the growths, to which he gives the name of adeno-encephaloid cancer, indicates a glandular as distinct from a squamous epithelial origin for the growth. The ordinary epithelioma of the bladder is a growth of variable size and extent, either limited to one spot, from which it spreads, or diffuse, occurring in a variable number of patches, one usually showing evidence of being the primary growth. The tumour is not encapsuled, but infiltrates the submucosa and muscular layers, spreading to the peritonæum, the bowel, the prostate, or even extending to the perinæum, where it forms a fungating mass. This latter is liable to occur in cases where the growth has been partially removed from the bladder after perinæal section, the cancer invading the granulation tissue of the wound, and spreading along it to the surface.

The mucous membrane over the growth may be ulcerated and fungous, or covered with papillary growths,‡ showing no outward evidence of malignancy, or even quite smooth and apparently unaltered, in the smaller patches. The stroma of the growth, composed of the tissue of the submucous and muscular layers, with more or less round cell infiltration, is full of alveoli well packed with epithelial cells, following, with more or less accuracy, the types of the bladder epithelium. Psorosperms have been met with in the epithelial cells, and by some are regarded as the cause of the malignant growth.

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* Kaltenbach, *Langenbeck's Archiv.*, xxx., 1884.

† *British Medical Journal*, May 21, 1887.

‡ Cornil and Reliquet, *ut cit.* See Fig. 114 and text.

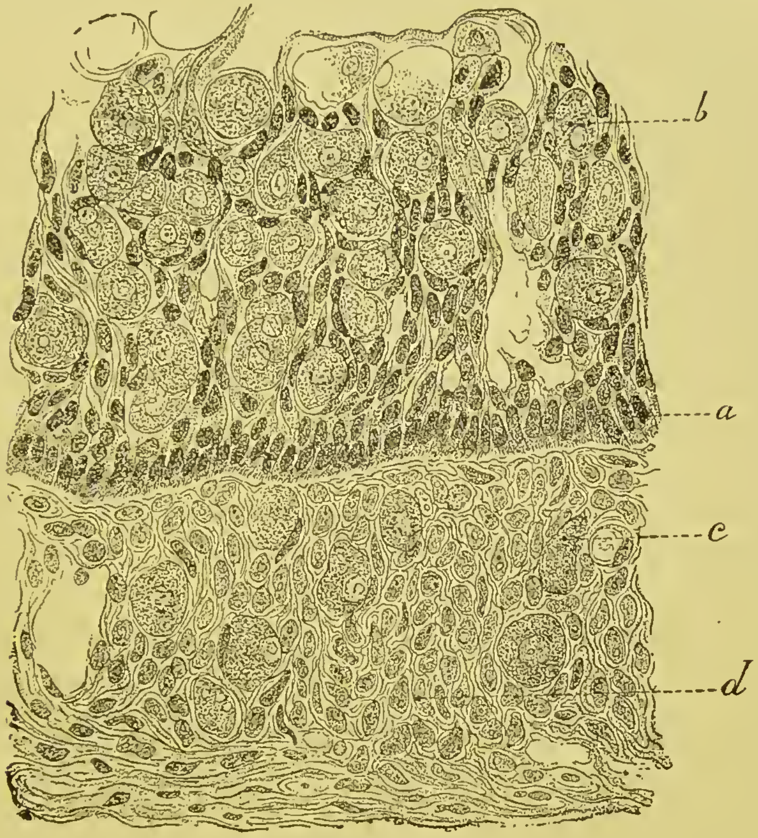

Fig. 138.

(*a*) Epithelial cells. (*b*) Psorosperms. (*c*) The same parasites in the connective tissue. (*d*) Inflamed connective tissue.

They are described and figured by Albarran in his work on tumours of the bladder.* I am indebted to this author for the accompanying illustration (Fig. 138), showing psorosperms, from his book. The formation of "cell nests" varies much in different specimens and even in different parts of the same specimen. Colloid degeneration may occur in primary carcinoma of the bladder, but is by no means common.

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* *Les Tumeurs de la Vessie*, J. Albarran. Paris, 1892.

Secondary carcinoma: Secondary cancer of the bladder is much more common than primary cancer. It is usually due to direct invasion of the bladder wall by growths originating in the prostate, rectum or the uterus. In either case the growth infiltrates the bladder wall, and may cause symptoms such as vesical tenesmus and hæmaturia, or it may interfere with the flow of urine into or from the bladder, with corresponding symptoms. Indications of the previous existence of the primary growths are not, as a rule, wanting. The structure of the secondary growth is, of course, a repetition of that of the primary one.

Enchondroma: Two cases of enchondroma of the bladder have been described,* but in neither case does the description render it other than doubtful that the growths had their origin in that viscus. A case of vesical angioma is described by Langhans.†

Cysts of the bladder: Serous, hydatid,‡ and dermoid cysts of the bladder are occasionally met with. Serous cysts may be due to softening of a myoma, or they may be simply cysts formed in the mucous membrane. Hydatid cysts may occur in the bladder wall or its immediate neighbourhood as elsewhere. Cases are from time to time recorded where hairs have been passed in the urine. In some cases the hair doubtless came from dermoid cysts of the ovary which had ruptured into the bladder, but in others they have unquestionably originated in true vesical dermoid cysts, or, as in Martini's § case, from a patch of true skin bearing hair follicles and forming part of the bladder wall. Such an occurrence would depend upon a developmental aberration, by which a portion of the bladder wall had been formed by the ingrowth of epiblast to make up for some deficiency in the hypoblast.

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* *Gazette Médicale de Paris*, 1836. *Trans. Société Anatomique*, 1861, p. 191.

† *Virchow's Archives*, vol. lxxxvi.

‡ Fenwick, *Path. Soc. Trans.*, xxxvii.

§ Martini, "Ueber Trichiasis Vesicæ," *Langenbeck's Archiv.*, xvii., 1874.

Bilobed and pouched bladders* and hernial saccular protrusions of the mucosa need only be named here. Cysts of the urachus are not very infrequent.

The presence of the bilharzia hæmatobia sometimes leads to the formation within the bladder of fungating masses of exudation tissue, attended with profuse hæmaturia, which have called for operative procedures for their relief. These have been referred to in a previous lecture in connection with the disease generally which is due to this parasite.

Tumours of the prostate. As the prostate is composed of fibrous, muscular (unstriated), and epithelium-lined gland tissue, we may expect to meet with connective tissue tumours, myoma, adenoma, and carcinoma, and these we find to be the new growths of this part.

Myoma: Unstriated muscular tumours of the prostate are met with as small encapsuled growths, most frequent in the so-called middle lobe, or as large masses apparently involving the whole part. Such a case was Mr. Spanton's,† where a mass of growth the size of a fist was removed by operation, and a further equally large mass was found at the autopsy. The structure of this particular tumour is well represented by Fig. 139. It closely resembles that of a moderately soft uterine myoma, and in this connection the developmental identity of the female uterus and male sinus pocularis with its immediately surrounding muscular fibre is to be noted. Pure myoma of the prostate is a rare growth. The encapsuled tumours usually contain a considerable admixture of glandular tissue, and are properly called adeno-myoma. They correspond to the adeno-fibroma so frequently met with in the female breast.

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* *Path. Soc. Trans.*, xxxvi. p. 283.

† *Lancet*, vol. i. 1882, p. 1032; also F. T. Paul, *Lancet*, January, 1883.

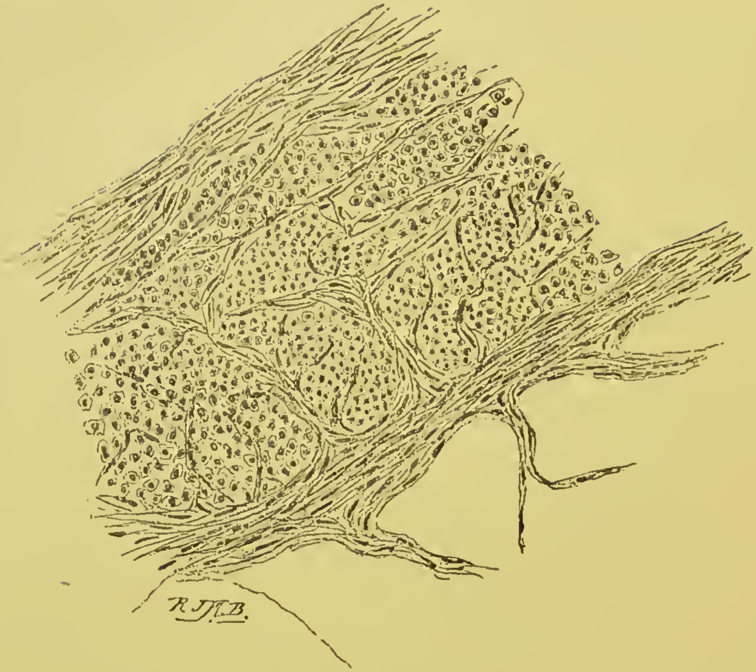

Fig. 139.

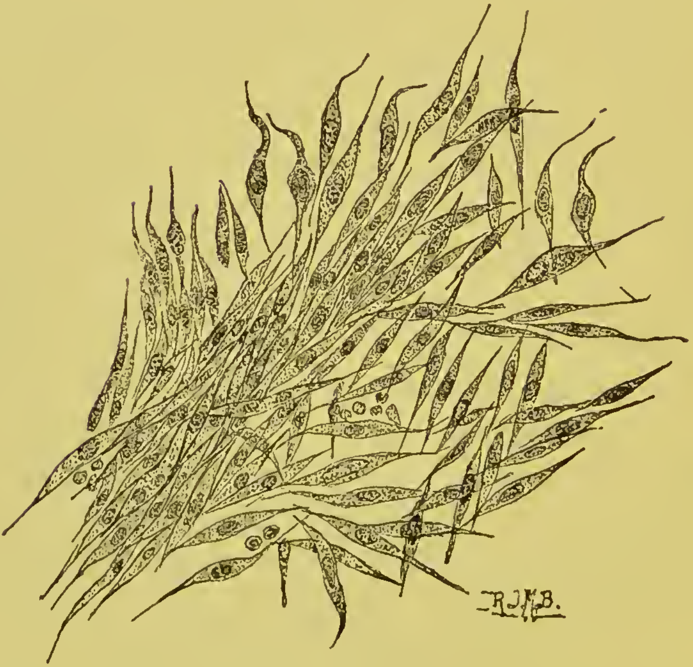

Fig. 140.

Sarcoma of the prostate would appear to be the form of new growth most frequently met with in this part. In structure it may be round or spindle-celled, or, as is frequently the case in the bladder, a lympho-sarcoma. The specimen represented in Fig. 140, a section only, was a beautiful example of large spindle-celled sarcoma occurring in a man aged fifty-eight, with secondary deposits having the same structure in the lumbar glands and in the lungs. The case is one of those reported on by Mr. Paul in the paper quoted.

Carcinoma of the prostate is either tubular or acinous, and, in either case, may become colloid. Figs. 141 and 142 represent two specimens of this growth, and in some parts of the latter the colloid change was just beginning. The sections show a stroma composed mainly of unstriated muscular fibre, containing alveoli filled with cells resembling those of the prostatic glands.

Primary carcinoma of the prostate is not of such rare occurrence as is generally supposed. It is frequently overlooked, both during life and after death, any enlargement or induration being regarded as merely ordinary hypertrophy. In several instances I have seen, where the diagnosis was verified by skilled microscopical examination, the disease was marked by slow progress and the slightness of the local symptoms that were present throughout. It appeared to prove fatal by the general decay that was induced, rather than by any interference it occasioned, directly or indirectly, with the function of micturition, thus contrasting with advancing forms of ordinary prostatic hypertrophy. The following case seems to illustrate this:—

Case.—I frequently saw a gentleman, aged 59, in 1884, who suffered from irritability of the bladder, which he could not completely empty. He was losing flesh, becoming pale, and, though the mental faculties remained vigorous to the last, he constantly complained of pain in the loins, nates, and thighs. In the

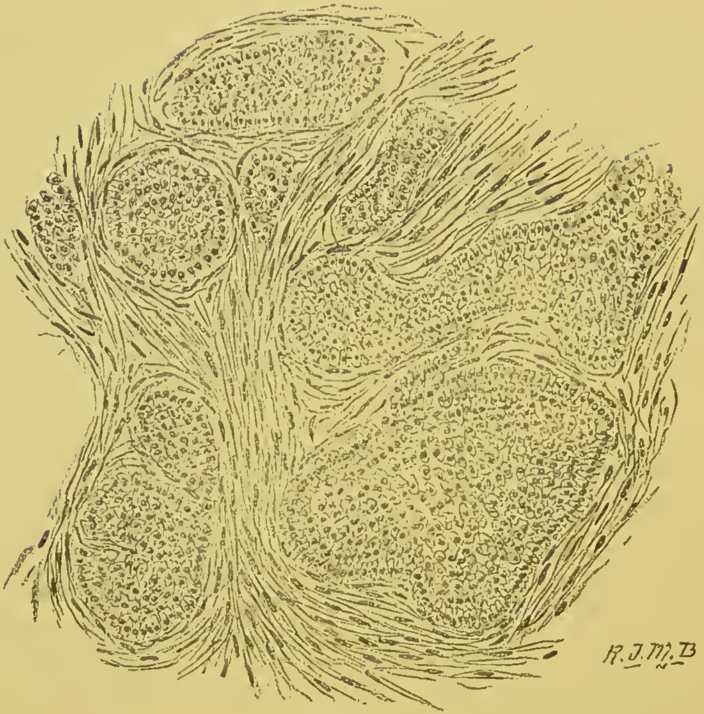

Fig. 141.

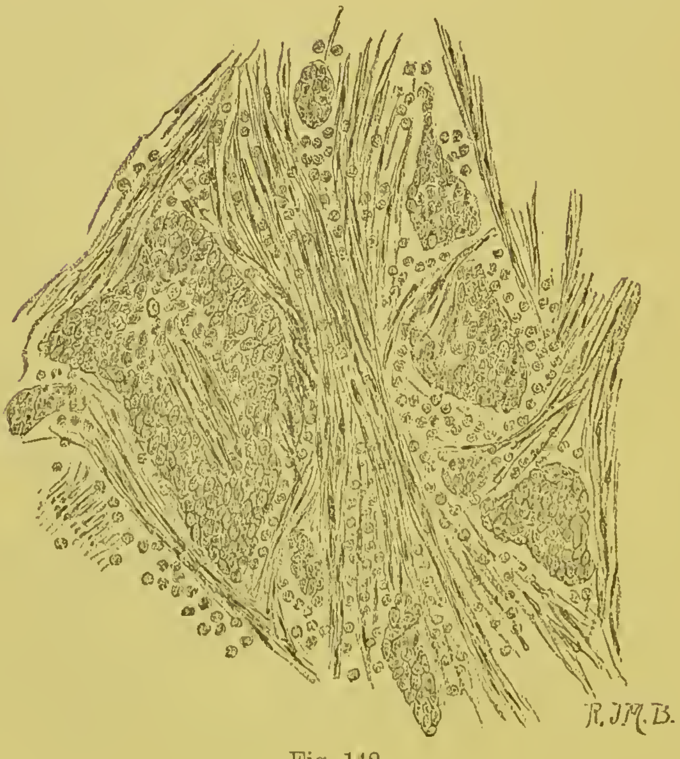

Fig. 142.

course of a few weeks he became entirely dependent upon the catheter. His prostate was hard, nodular, and almost insensitive to the touch, though no glands in the neighbourhood were involved. As his general health slowly declined, minute patechial spots appeared on various parts of his body, and his feebleness gradually increased. Occasionally he passed a small quantity of blood with his urine. He appeared to die of exhaustion, the result of prolonged blood vitiation. After death his prostate was examined by Mr. Paul, who reported it to be an unmistakable example of carcinoma. There was no evidence to show that this was other than the primary disease.

Mr. Bryant* has recorded a case of fibrous polypus of the prostatic portion of the urethra, associated with profuse hæmaturia and prostatic enlargement, where on exploration by a median perinæal operation a polypus the size of a haricot bean was removed. After a somewhat tedious convalescence recovery ensued, and eighteen months after the operation the patient was well, with his prostate contracted to its original size.

The prostate is frequently the seat of small calcareous deposits, which have been described under the name of prostatic calculi. They probably represent a concreted state of the natural secretion of the prostatic glands.

Tubercle of the prostate, which is first miliary and then caseous, may be mistaken for new growth if care be not taken to exclude it on clinical grounds. It is, as a rule, secondary to tubercle of the kidney and bladder, or of the testicle, most frequently the latter. Prostatic cysts may be either retention cysts of the prostatic follicles, or, what is more usual, urethral diverticula, such as one recorded by Mr. W. Arbuthnot Lane.†

Some growths involving the urethra have been already referred to in connection with malignant or cancerous strictures. Polypi of an innocent kind are sometimes met with in this position. Mr. W. H. Brown* records an instance which is unique.

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* *Trans. Medical and Chirurgical Society*, March 14, 1893.

† *Path. Soc. Trans.*, xxxvii. p. 288.

Case.—The patient, a male, aged 18, was under observation during 1891, for difficult and painful micturition. The pain was referred to the end of the penis, and there was frequent incontinence at night and dribbling of the urine when walking about. On one occasion, whilst straining to urinate, about two ounces of bright blood were expelled. On his attempting to pass urine the stream was very small, and a curious balloon-shaped swelling just over the urethra at the junction of the penis with the scrotum was observed. The urine was natural. The boy

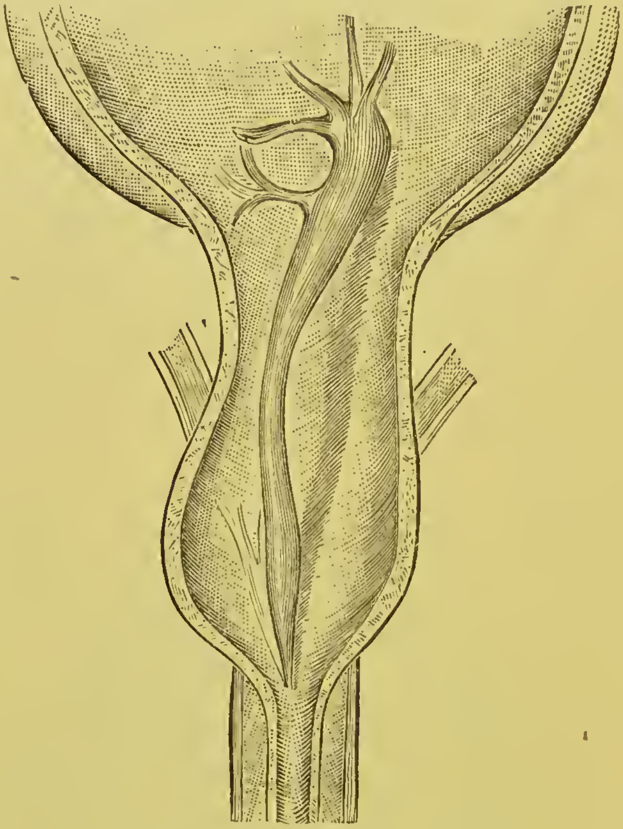

Fig. 143.

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* *Lancet*, April 14, 1891.

died of extensive cystic disease of the kidneys. The growth in appearance resembled a polypus, and was attached behind to the prostatic region in the posterior wall of the bladder, and in front to the urethra as shown in the drawing (Fig. 143). Mr. Brown observes: "I have not been able to find a similar record. The position of the tumour and its twofold attachment are, so far as I know, without parallel."

THIRTY-FOURTH LECTURE.

The Treatment of Tumours of the Bladder and Prostate.

For clinical purposes relative to treatment it will be convenient to consider tumours of the bladder as they are usually presented to our notice. We can recognise three periods in the existence of many of these growths, irrespective of the question of degree of malignancy or otherwise, which, though not defined by any artificial lines, are sufficiently distinctive for the object in view. These stages may be spoken of as (1) Quiescent; (2) Symptomatic; (3) Destructive. I must not, however, be understood to imply by this that all growths pursue the several courses I have thus indicated. Some, so far as we know, are quiescent throughout, being only accidentally discovered either during life or after death; others terminate existence by the symptoms they produce rather than by any morbid characteristics they inherently possess; whilst a third group, like cancerous affections, are fatal by the tissue destruction they directly effect, and the consequences on the system generally arising out of this. With this reservation the grouping suggested for clinical purposes may suffice.

1. *The Quiescent Stage.* This includes the early stages of growths, where they proceed up to a certain point without giving any specific indication of their presence. Some of the innocent tumours of the bladder have thus remained during the whole period of their existence, in-

stances having been recorded where they were casually discovered by the electric cystoscope. Other examples have been found in autopsies where no distinctive history appeared to have been connected with them, and cases are known in patients of the total cessation, after varying periods, of symptoms which seemed to be those connected with villous growth or papillomata. Whether their disappearance was due to an inflammatory act within the bladder or by sloughing it is impossible to say, but such an occasional termination is sufficiently well authenticated for acceptance. The evidence that a person has a tumour in his bladder would not alone, in the absence of other reasons, warrant operative measures being taken for its removal. Nor does the persistence of a single symptom—such, for instance, as occasional hæmaturia without causing detriment to the general health—justify the performance of an operation involving the opening of the bladder merely on the presumption that some growth exists within the area of the viscus or the prostate. Some prostates which are enlarged occasionally bleed just as a hæmorrhoid will do, and with as little harm, and pieces of prostatic hypertrophies have occasionally been removed as growths or tumours with, I believe, insufficient reason.

2. *The Symptomatic Stage.* The larger proportion of bladder tumours sooner or later pass out of the quiescent condition, and enter upon the second or more active stage of their existence. Whether this transition is slow or rapid, gradual or sudden, greatly depends on their kind as well as the accidents and contingencies connected with their growth; but whether innocent or malignant, primary or secondary, the majority of them sooner or later make it apparent that life will eventually be destroyed, either by persistent hæmorrhage or ulceration, or by the degree micturition is interfered with. Continuous or intermittent hæmorrhage, evidence of ulceration, and interference with micturition are the

symptoms of progressive tumour of the bladder which may be sufficient to indicate operative interference. In addition, valuable assistance in diagnosis can generally be obtained by examination of the bladder from the rectum and with the sound, and by the evidence that may be furnished by an inspection of the growth. By the rectum the finger will frequently prove that the posterior wall of the bladder, as well as the contiguous portion of the bowel or prostate, is implicated in a growth of an irregular form and consistence, partaking of the characteristics usually associated with the physical signs of malignancy. Exploration with the sound will often also unmistakably indicate that the area of the bladder is more or less encroached upon by a new tissue formation, which as a rule readily bleeds, even under delicate manipulation. Direct evidence is sometimes afforded by the microscopical examination of portions of growth voluntarily discharged during micturition, or removed in the eye of a catheter or by any other instrument. Too much importance must not be attached to this, in the absence of symptoms of a corroborative nature.

In the present day the most reliable evidence of the presence and nature of a tumour within the bladder, including some varieties of prostatic outgrowths, is to be obtained by the illumination of the interior of the viscus by means of the electric light and the use of a suitable speculum in connection with it. The mode of doing this is shown in the following figures from Albarran* (Figs. 144, 145). Apart from the question of diagnosis, it is upon an examination of this kind, taken in conjunction with the symptoms each case presents, that conclusions as to treatment, more particularly in reference to operative measures, are to be drawn and a course decided upon. Ocular inspection obtained in this way has now almost entirely superseded the digital explorations which were practised before the introduction and perfecting of this means of diagnosis. It is for these reasons that attention may here be drawn most conveniently to electric cystoscopy. For its general application to local states of urinary disturbance reference should be made to special works upon this subject, amongst which I may mention those of my colleague, Mr. Hurry Fenwick,* as containing the fullest information, and as furnishing the most practical guide to all matters relating to it. I have already indicated the symptoms which would suggest the presence of a growth within the bladder, and the necessity for proceeding to an examination of this kind.

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* *Op. cit.*

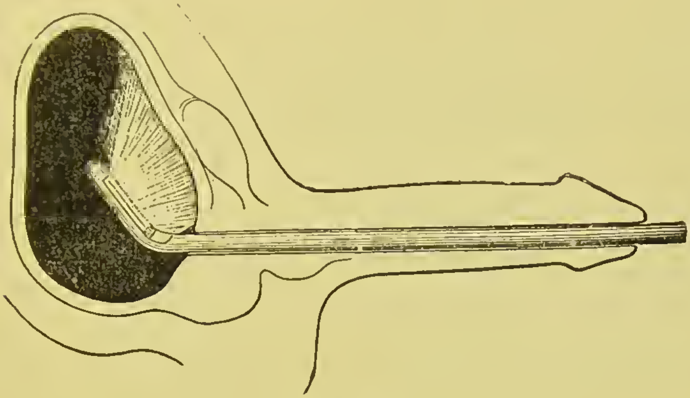

Fig. 144.

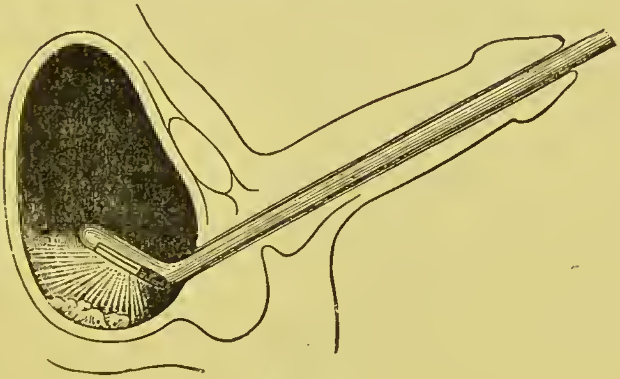

Fig. 145.

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* *The Electric Illumination of the Bladder and Urethra.* Churchill, 2nd edition, 1889.

Atlas of Electric Cystoscopy, by Burckhardt and Fenwick. Churchill, 1893.

For this purpose I have been in the habit of using Leiter's instruments, which were supplied to me by Mr. Schall. As a rule it is best to have the patient placed under an anæsthetic, and in the lithotomy position, at the end of an operating table of a suitable height. A deep injection of a ten per cent. solution of cocaine in some cases suffices to render the examination painless. The following requirements, as stated by Mr. Fenwick,* are necessary for success: "(1) The urethral canal must have a calibre of twenty-two French catheter gauge. (2) The bladder must have a capacity of at least four ounces. (3) The water in the bladder must be translucent, and ought to be perfectly transparent." The last condition is probably the most difficult to obtain in cases of growth, and requires some patience and aptitude in the preliminary irrigating of the bladder. Washing out with equal parts of hazeline and hot water will often render the urine clear of blood.

The kind of vesical growth and the possibility of its complete or partial removal may in this way be determined with much accuracy. In Fig. 146 † we have a form of pendulous papilloma where removal may usually be undertaken with the prospect of permanent success; whilst in Fig. 147 ‡ is represented a diffuse villous carcinoma of considerable extent, where operative measures can do no more than palliate symptoms arising from constant hæmorrhage and obstruction to micturition, as well as from the tension produced by the pressure of the growth on the wall of the bladder. Hence the growths that are most accessible to operative treatment are those belonging to the former variety. Their diagnosis is tolerably easy; they are usually situated at the most accessible part of the bladder, namely, at the orifice of a ureter, and when removed, as I have had frequent occasion to note, they do not recur. On the other hand, the carcinomata and semi-malignant growths of the bladder, so far as their removal by operation is concerned, in no way differ from what is observed, in this respect, in connection with similar tumours situated in other parts of the body.

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* *Op cit.*

† *Clinical Lectures*, by the late Mr. Richard Quain, F.R.S., plate xxiv.

‡ *Carcinome Villeux Diffus de la Vessie*, par MM. Cornil and Reliquet. Paris, 1886.

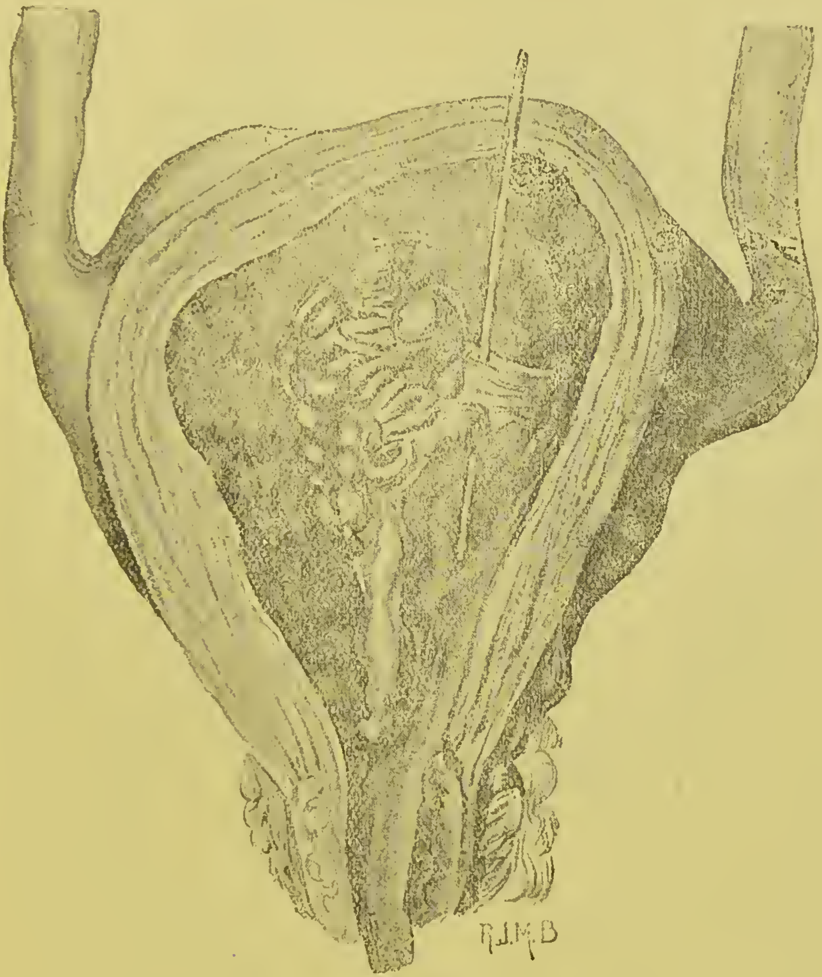

Fig. 146.

I have opened the bladder in some cases by the suprapubic, and in others by the perinæal method, though the former is to be preferred, on the same principle that the intestine is sometimes opened and an artificial anus formed to relieve the obstruction and distress which is occasioned by a cancer situated lower down the intestinal canal. On grounds such as these a supra-pubic opening for drainage, and as a substitute for the long and narrow channel of the natural urethra, is to be recommended when the nature of the symptoms demands it by reason of the bladder being obstructed by a more or less fungating cancer. In the following case the relief afforded by operation was marked and continuous as long as the patient lived :—

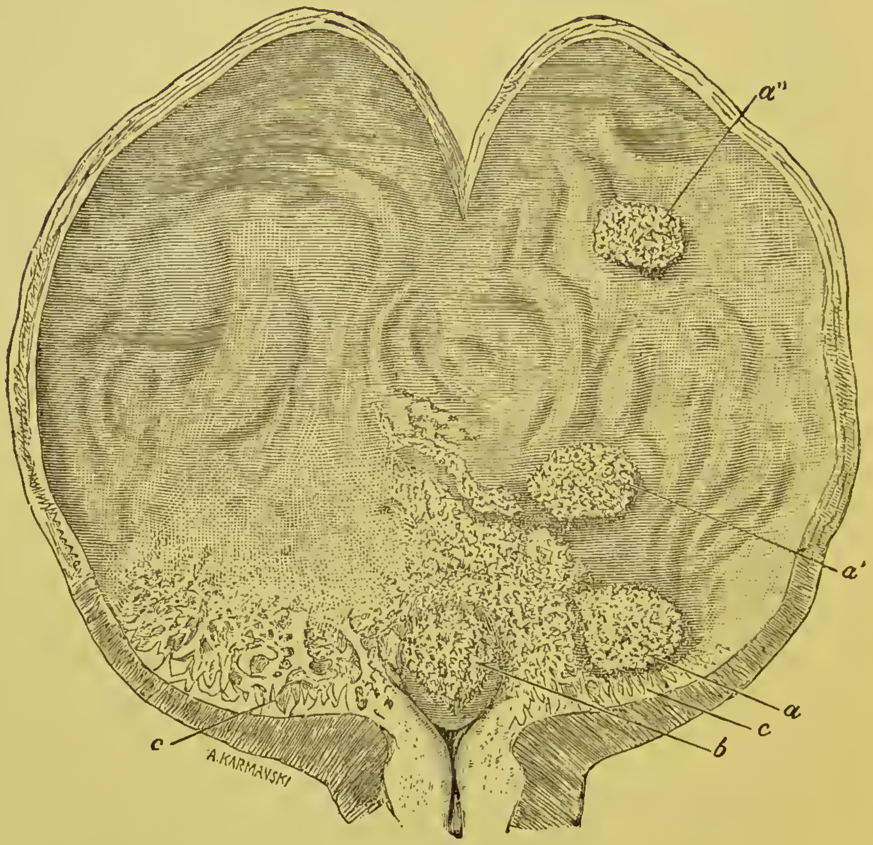

Fig. 147.

a, *b*, *c*, various stages of growth.

Case.—A male patient, aged 66, whom I saw towards the end of 1892, had been suffering from vesical hæmorrhage for many months previously. The bleeding, retention of urine and clots, and the pain from tension had become so constant and unmanageable as to indicate the necessity for adopting other means, as all medicines as well as catheterism and irrigation of the bladder had proved useless. I advised a supra-pubic opening, which I made shortly after I first saw the patient, and removed portions of a carcinomatous growth from a hard base immediately above the prostate. The relief was complete, the growth was checked, and the hæmorrhage only slight and occasional. The interior of the bladder was rendered clean and aseptic by passing a soft catheter each day along the urethra and washing out through the wound. The urine was discharged by the opening, and the patient kept dry by means of wood-wool pads. He was enabled to get about again, and remained free from pain until a fortnight before his death, five months afterwards.

When it is determined to operate for the removal of a tumour within the bladder, either with the object of cure or relief, supra-pubic cystotomy is on all grounds to be recommended. It will hardly be necessary to add to the remarks I have already made in a preceding lecture concerning this operation in its application to intra-vesical growths. If the connections of the tumour are extensive, and there is a doubt as to whether all can be got away without doing serious damage to the bladder itself, I feel sure that we had better content ourselves with the opening, which may under all circumstances be safely made, and the drainage with a suitable apparatus that this aperture will provide. The lesser proceeding has in many instances proved the means of arresting hæmorrhage, and of adding materially to the comfort as well as to the life of the patient, even where it has been found impossible either to remove the tumour or with safety to reduce its size. And what applies to the male is equally applicable to the female, though with the latter, by reason of the anatomical differences in the parts, both exploration and removal can be more readily effected.

It must not be overlooked that in some cases of malignant tumour of the bladder which have been operated upon recurrence has taken place in the wound. Dr. J. H. Neale* records an instance of adeno-encephaloid cancer of the bladder, operated on by Mr. C. H. Marriott, where the wound and perinæum adjoining were subsequently largely invaded with the growth. Mr. Marriott remarks: "This case alone appears to me to put a limit to the range of surgical treatment of vesical tumours. Where a polypoid or pedunculated growth is diagnosed, by all means remove it; but in the case of a sessile tumour, closely incorporated with the muscular walls of the bladder, the treatment best suited to the requirements of the case seems to me to establish and maintain free drainage and so relieve the strangury, leaving the tumour to take its own course." In this expression of opinion most surgeons of experience I think will agree.

Some cases of partial resection of the bladder wall containing a growth have been recorded by Albarran and others, but this method of treatment has so far not proved to be practicable except to such a limited extent as hardly to require special notice. The fact that the whole mucous membrane of the bladder may slough and be cast off, as illustrated in connection with Fig. 70, is of some interest relative to this aspect of the subject.

In malignant growths involving the bladder, which are considered as being outside the pale of operative treatment, the question arises, can anything be done either to check their progress or to avert the blood deterioration which becomes evident? For these purposes iodide of potassium and chian turpentine have sometimes been used with apparent temporary advantage. The former certainly does occasionally check the growth and extension of neoplasms, whilst the latter has been known to do more, as stated by Mr. Clay, when given in malignant growths involving more particularly the urinary passages. The latter circumstance may possibly be due to some of the constituents of the drug being eliminated by the urine, and may explain its efficacy, as undoubtedly observed in some instances, in controlling hæmorrhage and rendering the absorption of cast-off products of inflammation less deleterious.

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* *British Medical Journal*, May 21, 1887.

3. *The Destructive Stage.* The last phase of malignant growth within the bladder may be the inclusion of other parts, such as the intestines, and the formation of a fistulous communication between these two cavities. The symptoms attending such a termination are generally of a most distressing nature, due to the intermixture of fæces and urine. Though colotomy cannot be performed for malignant perforations with the hope of obtaining a permanent cure, it is often to be recommended as a means of arresting pain and prolonging life. It proved so in the following case, where the disease appears to have commenced in the rectum and spread to the bowel:—

Case.—J. R., aged 53, was admitted into the Liverpool Infirmary, on October 9th, 1877, suffering from a malignant recto-vesical fistula. He was in a very miserable and reduced condition. Within the rectum was a scirrhous ulceration, which communicated with the bladder by means of an opening through which a large-sized bougie could be passed. On introducing a catheter into the bladder there was first an escape of fœtid flatus, followed by urine containing fæces. The patient was suffering severe pain, much of which was due to the frequent distension of the bladder with flatus. Frequent washing out of the bladder and rectum, together with anodyne applications, failed to give any permanent relief. I opened the left colon, and established an artificial anus. The relief that followed this was most marked, all the more distressing symptoms disappearing. For some time the patient improved; death took place from exhaustion on December 1, 1877. *Post-mortem* examination showed extensive ulceration between the rectum and bladder.

The operation fulfilled my expectations—that is to say, it prolonged life and mitigated pain, and my only regret was that it had not been performed at an earlier date.

Though hardly coming within the category of tumours of the bladder and their treatment, there is a point connected with sacculated extensions of the bladder wall which may be referred to here. It was impossible to examine the specimens brought forward by Mr. Targett * in his recent lectures without realising the fact that when urine is collected in certain of these diverticula it is possible for the catheter to be introduced, either by the surgeon or the patient, without drawing urine, though the instrument has reached the general cavity of the viscus. I have occasionally met with instances where this occurrence has caused much apprehension and doubt. It is well to remember that though a patient may have several ounces of healthy urine in a sacculus, and be conscious of the desire for its expulsion, it does not necessarily follow that the catheter will be of assistance unless the sac has overflowed either by natural repletion or by an altered position of the pelvis. Again, a distended pouch may create a wish to urinate without the contractile power within it being provided, and thus spasmodic efforts are aroused, which, at first sight, may be difficult to explain.

The functions of the bladder may be seriously interfered with by the growth of tumours having origin in other organs or parts, such as the uterus and ovaries in the female, and in the contents of the pelvis generally, including growths springing from the pelvis. These occasionally fungate into the bladder by ulceration through it, and thus cause hæmaturia. The following case of recurring central enchondroma of the left pubic bone, pressing upon the prostate and neck of the bladder, was operated upon and is deserving of a notice in this place :—

Case.—D. R., a man aged 35, came under notice in December, 1885, when I removed an enchondroma about the size of a

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* *British Medical Journal*, July 29, 1893.

walnut from the pubic bone, which it was thought better to extirpate. A recurrence seems to have taken place, and a year afterwards he again presented himself with a similar growth, but of greater extent, as shown in the figure (Fig. 148), which was made by Dr. Fox Parry. The tumour, by encroaching on the neck of the bladder, was commencing to interfere with micturition, and on January 9, 1886, it was again removed by enucleation, and the cavity sponged out with a strong solution of chloride of zinc. The patient made a good and permanent recovery.

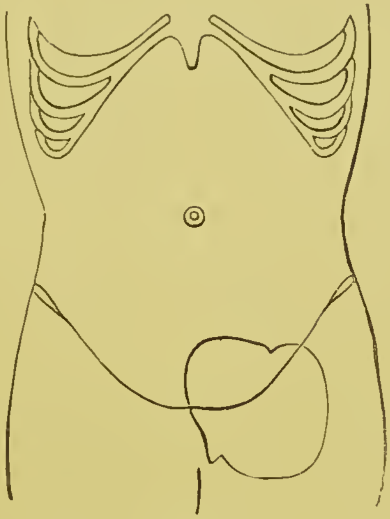

Fig. 148.

After what has been already said in connection with the subject of prostatotomy and prostatectomy (Twenty-first Lecture), I do not think it will be necessary to make further reference to the operative treatment of tumours of the prostate. Most of these are inseparably connected with the bladder, and but little can be done by operation. When the catheter fails to relieve pain and the distress which the retention of urine and blood-clots is capable of causing, the propriety of perinæal incision for exploration, drainage, and, if found feasible, extirpation of the part, may then be considered, as I have illustrated.

In the following case excision of a malignant enlargement of the prostate was undertaken :—

Case.—J. B., aged 64, came under my observation in August, 1882. His chief symptoms related to hæmaturia and frequency in micturition. Two months previously he noticed that his left testicle became swollen. On exploration by the rectum the prostate was found somewhat enlarged, indurated, and nodulated. On examination with a sound some obstruction was revealed in the prostatic urethra, but neither stone nor roughness within the bladder could be detected. On October 25th I opened the membranous urethra as for the median operation for stone. On exploring the prostate I found a solid mass projecting into the urethra and occupying the neck of the bladder, which I succeeded in enucleating tolerably completely. The mass removed was about the size of the last phalanx of the thumb, and was evidently a new growth. The removal of the tumour was not attended with any serious hæmorrhage, it not being necessary to tie a vessel. On the third day after the operation the urine was clear from blood, and remained so for ten days, when it again returned in a small quantity, and finally disappeared. On December 1st the patient was able to leave the Infirmary, the perinæal wound having almost entirely healed, but he had not complete control over his bladder.

On December 15th he returned to the Liverpool Infirmary. The dresser's report is as follows: "The urine is free from blood, and all comes by the urethra. Dec. 20th: A rubber catheter was tied in the bladder for a few hours daily.—Jan. 8th, 1883: The patient is in much the same condition, but he is able to retain his urine for about half an hour. He was measured for a urinary truss, made after Mr. Harrison's directions, with the view of providing against the incontinence, consisting of an ordinary leather covered truss-spring, terminating in an ivory ring, well padded, through which the penis is passed, the object being to exercise steady pressure on the urethra immediately below the arch of the pubes. It was found that this apparatus completely restrained the escape of urine and enabled the patient to get about his business with comfort." This patient lived comfortably for fourteen months after the operation. He had no recurrence of the hæmorrhage, and partially resumed his occupation as a stevedore; then the glands in his left groin began to enlarge extensively, and in two months more he died.

Mr. Paul reported that the growth was a carcinoma of the acinous variety, the general appearance resembling an ordinary scirrhus of the breast. The cells are from two to three times the size of a pus cell, and some contain more than one nucleus. Those next the basement membrane are in places elongated and more regularly arranged. The alveolar stroma is very rich in cells, and in many places shows a number of non-striated muscular fibres. The growth may be considered to have originated in the prostate, and not to have spread to it from the bladder, as it is very doubtful if an acinous variety of carcinoma ever originates in the latter.

THIRTY-FIFTH LECTURE.

Varicocele—Palliative and Radical Treatment—Amputation of Penis—Seminal and Mucous Discharges from the Urethra—Spermatorrhœa.

Varicocele is a morbid condition of the spermatic cord which so often incidentally comes under notice in connection with diseases of the urinary system, that I purpose making reference to it. The term is applied to a dilated or varicose state of the veins of the cord (Fig. 149), and consequently, like similar affections of these blood-vessels in other parts, it varies much in degree and in the amount of inconvenience it causes. You will often observe that the symptoms attending varicocele are in no way proportionate to its extent; that is to say, you will find patients with a small varicocele complaining very much, whilst, on the other hand, some large ones appear to occasion little or no inconvenience. And this points to the relation in which the affection stands to the nervous system, in causing effects which are seen in the dismal forebodings so frequently indulged in by the subjects of it. Hence, in treating it you will do well

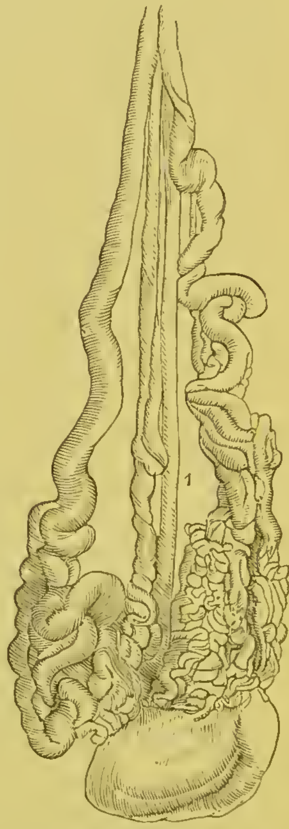

Fig. 149.
1. Vas deferens.

to remember Sir James Paget's observation, that it may be "a mental error, not a bodily one, that needs cure."*

In addition, however, to being a source of annoyance and ill-health to some persons, this affection is frequently a barrier against their entrance into various employments and public services. The following table, for instance, shows the number of rejections for varicocele in the recruiting service of the British army for ten years:—

Year.	Rejections.	Ratio per 1,000 rejected.
1879	630	14·77
1880	742	16·09
1881	800	16·86
1882	764	16·82
1883	1,086	18·27
1884	1,060	15·85
1885	1,222	16·91
1886	1,330	17·74
1889	943	15·47
1890	825	16·77

In the Royal Navy the following table represents the number of rejections for varicocele amongst seamen and marines at London recruiting depôts:—

	Seamen.		Marines.	
	Rejected.	Ratio.	Rejected.	Ratio.
1884	171	101·3	108	65·41
1885	228	107·9	124	87·57
1886	65	56·13	51	45·86
1887	59	52·96	49	38·46
1888	44	56·62	45	38·16

Amongst the officers examined the rejections for varicocele practically amounted to *nil.*

Writing to me upon this subject, Sir Joseph Fayrer observes:—

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* *Clinical Lectures and Essays.*

"As far as my experience goes, hot climates are very prejudicial to those who suffer from varicocele; indeed, unless the condition be very slight, we never pass candidates who suffer from it for India. The heat, hepatic derangements, portal congestion, &c., are all aggravating causes. In my opinion no one who suffers from varicocele should go to India—I mean, of course, with the intention of remaining and working there."

Mr. R. W. Watson, in a paper on this subject, remarks:*—

"I wish to draw attention to the prevalence of varix and varicocele at the Greenwich School, as shown in the report of causes of rejection of boys for the navy, published in the *Journal* for the 19th May. Varix being a disease of adult life, we may assume that most of the cases were varicocele. All the boys were examined, and passed as free from disease at thirteen years of age. Out of 864 boys, 43, or 5 per cent., were rejected for this; or, out of the 70 per cent. rejections, 7 per cent. were due to this disease. On looking closer at the report, we find that the disease is very unevenly distributed in the school. In certain classes, numbering 630, only 3 per cent. were affected, while in the classes, numbering 234, mentioned below, 10·25 per cent. were affected. Amongst the bricklayers, kitchen-boys, and hair-pickers, the proportion affected was 12·5 per cent.; mat-makers, 11 per cent.; select classes, pupil-teachers, and knitters, 10 per cent.; and painters and sail-makers, 8·3 per cent."

As a considerable portion of varicoceles can be permanently cured, these figures show how large a number of persons may be rendered available for the public services, as well as for other occupations in life, for which they were previously disqualified. A varicocele is readily recognised by the worm-like sensation it conveys to the hand on feeling it. It usually commences shortly after puberty, and is often assigned to some violent exertion, such as a strain. Some persons appear to have an hereditary predisposition to dilatation of the veins, and in these we have the disease appearing with apparently no other explanation. In extreme cases the veins almost conceal the testicle, but usually without occasioning any structural alteration in it. They are influenced by the position of the body, causing, when unsupported, and after much standing or walking, a sensation of weight, if not of positive pain. A varicocele is not likely to be mistaken for anything else, though in partially disappearing when the patient lies down, and in giving an impulse on coughing, it may now and then resemble a hernia.

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* *British Medical Journal*, June 2, 1883.

In reference to the cause of varicocele, which still may be considered a debatable question, Dr. Brinton, of Philadelphia, U.S.A., has made numerous dissections, some of which I had the opportunity of examining. These specimens led him to draw the following conclusions:*—

> "1. That the causes hitherto assigned are insufficient to account for the rare occurrence of varicocele upon the right side. 2. That the cause of the non-occurrence of varicocele upon the right side is referable to the existence of *a very perfect valve, hitherto unnoticed, at the termination of the right spermatic vein in the vena cava.* 3. That *no* such valve exists upon the *left* side at the termination of the spermatic in the emulgent vein. 4. That a similar valve exists in the *analogous vein* of the female, the *right ovarian vein*, but none upon the left side."

These differences in the arrangement of the veins on the two sides of the body are shown in the drawing on the next page by Dr. Brinton (Fig. 150).

Hence it is concluded that any downward pressure exercised upon the great internal venous trunks must necessarily act with greater force on the left spermatic veins as compared with the right. The explanation that is thus offered seems a probable one, and is worthy of further investigation. That chronic constipation is a contributory cause of varicocele I think there can be no doubt, as I have frequently observed it in persons of this habit, and have also noticed that attention to the state of the bowels is often immediately followed by an improvement in the local condition of the patient, as well as in the nervous sensations which are attributed to this cause.

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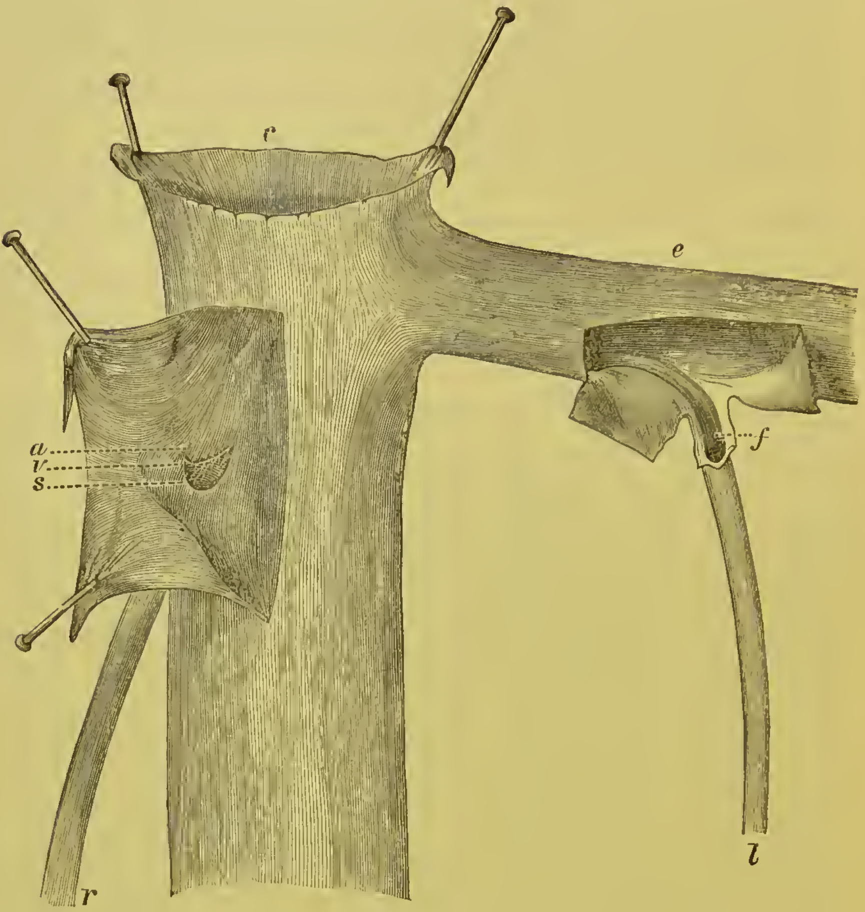
* *American Journal of Medical Sciences*, July, 1856.

The treatment of varicocele is palliative and radical. In the former, our object is, by artificial means, to provide a support for the distended veins, to prevent them enlarging or producing. symptoms by their distension. In the latter, by



(Fig. 150.)

EXPLANATION OF PLATE.

Dissection of the vena cava, emulgent and spermatic veins, showing the right spermatic valve, and its accompanying sinus.

c. Vena cava.
e. Emulgent vein.
r. Right spermatic vein.
l. Left spermatic vein.
a. Aperture by which the right spermatic vein empties into the vena cava.
v. Right spermatic valve.
s. Sinus, across which the valve is stretched.
f. Termination of the left spermatic vein in the emulgent vein.

setting up adhesive inflammation we endeavour to bring about their obliteration. These principles are similar to those we recognise in the treatment of the more familiar instance of varicose vein, as seen in the legs.

It is the practice to apply support to the veins by a variety of expedients. Of these I may mention the late Mr. Wormald's plan, the description of which is given in his own words:—

> "A ring about an inch in diameter, made of soft silver wire, of a suitable thickness, was padded and covered with wash-leather. Through this I drew the lower part of the scrotum, whilst the patient was in the recumbent position and the veins comparatively empty; then pressed the sides of the instrument towards each other with sufficient force to prevent the scrotum escaping. The use of this instrument every morning before the patient rose from his bed enabled this gentleman to walk nineteen miles on the third day after the first application; and although he has for six years worn an instrument of this description, he has never experienced the least inconvenience."[*]

Then we have the ordinary suspensory bandage, which in slight cases suffices; whilst in more extreme ones there are modifications of this appliance which will be found useful. Mr. Keetley has described a form of suspensory bandage, made in three sizes, which is figured in the sketch on the next page[†] (Fig. 151), and can be recommended. A method of suspending the testicle and giving support to the enlarged veins of the cord has been described by Mr. Morgan (Fig. 152):[‡]—

> "The testis is shown in the suspender, which consists of a piece of web, about 3½ inches wide at one end, 4½ inches long, 4 inches wide at the other, and cut gradually tapering to the narrower end. A piece of thick lead wire is stitched in the rim of the smaller end, and the sides are furnished with neat hooks, a lace, and a good tongue of chamois leather, two tapes being sewn along the entire length of the web, which are afterwards attached to the suspending belt. The application is

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[*] *London Medical Gazette*, April 28, 1838.

[†] *Lancet*, May 24, 1879.

[‡] *Dublin Quarterly Journal*, vol. xlviii.

easily made by the patient in the morning before rising; and, when the parts are relaxed, laying the affected organ, while in the dependent position, in the suspender, and lacing up the hooks with a moderate degree of tightness, then raising it and attaching the tapes to the suspending belt previous to rising from bed."

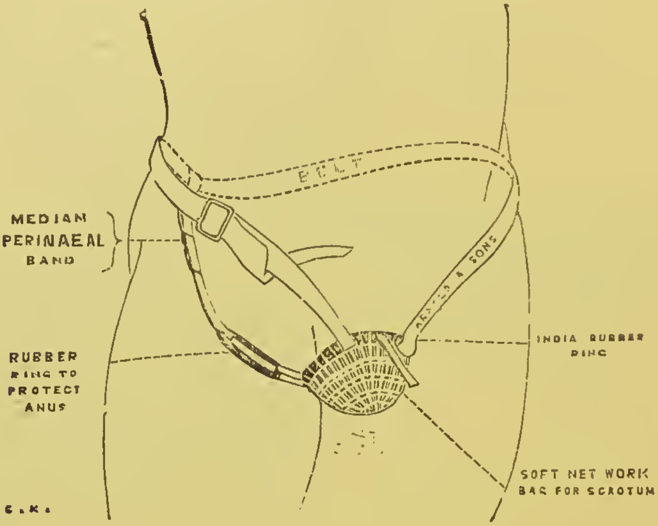

Fig. 151.

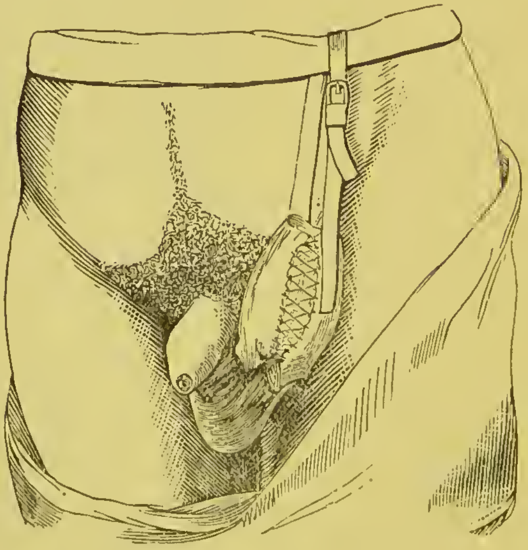

Fig. 152.

Some practitioners prefer treating this affection by means of a truss, with a pad over the external abdominal ring. Where this plan is adopted, care should be taken to select an instrument capable of giving sufficient support to the veins without exercising such pressure on the artery as to stop circulation.

The circumstances under which it is proper to resort to operative measures, with the view of permanently obliterating the enlarged veins, have been summed up by Dr. Ogilvie Will * as follows:—(1) If the varicocele be very large or increasing; (2) if the testicle be atrophied; (3) if acute pain be complained of; (4) if the patient be disqualified from entering the public service; (5) if the stability of the mental faculties be endangered.

Various means have been resorted to for effecting obliteration of the veins, including the subcutaneous ligature, as practised by Mr. Henry Lee, the introduction of needles and compression with twisted thread, and subcutaneous division with the knife. Mr. A. P. Gould † advocates the employment of the galvanic écraseur for the obliteration of the veins, and illustrates its feasibility by several successful cases. In conducting any of these operations care must be taken not to interfere with the vas deferens, which, by reason of its whipcord-like feel, is readily kept out of the way.

I will describe a mode of operating which, without prejudice to other procedures, has given me results which have been very satisfactory. It consists in exposing the cord by a vertical incision about two inches in length, and separating the veins which are most prominently varicose. These are tied in two places with a catgut ligature, and usually two plexuses require to be so dealt with on either side of the vas, as will be seen on reference to Fig. 149. In addition, it will be observed that there are a number of small veins in close proximity with the epididymis which cannot be obliterated in this way; these, when abundant, I destroy with a light

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* *Lancet*, May 15, 1880.

† *Ibid.*, July 17, 1880.

touch of the thermo-cautery, taking care, while this is being done, to protect the vas deferens by holding it from behind, between the thumb and index finger of the left hand. One or two sutures are introduced, and the wound usually heals by granulation. I have now been performing this operation for some years, and I am not aware of an instance in which a recurrence of the varicose condition of the veins has taken place. One great advantage of this method is that the surgeon sees what is included in the ligature.

Some surgeons have revived the practice of removing with a clamp portions of the scrotum for the purpose of giving a support to the enlarged veins of the cord, with the object of effecting their obliteration. Though I have had no experience in this mode of operating for varicocele, I am disposed to doubt its efficacy by reason of the remarkable way the scrotum is reproduced after it has been destroyed by sloughing arising from urinary extravasation. I recorded a case of this kind where the testicles were thus exposed and covered in by granulation. This patient happened to come under my care for stricture some years afterwards, when his scrotum was found entirely reproduced.

Mr. Mitchell Banks * practises the following procedure: "The parts having been carefully shaved, an incision about two inches in length was made over the spermatic cord, and the veins were readily isolated. They were tied across in one group with catgut passed beneath them with an aneurism needle at two places, the ligatures being about half an inch from each other. The intervening portion of vein was then cut out. Only two antiseptic dressings were required, and in five days the wound was healed. A hard lump remained above and below it, indicating that clotting had taken place." This does not differ materially from what I have described, though I prefer retaining the whole of the veins after their obliteration with the ligature, as I think a firmer and more

* *Clinical Notes*, 1884, p. 114.

permanent cicatrix is obtained. As Dr. Keyes * has pointed out, there is a risk of the adhesive action following operation on a varicocele not being sufficient to secure permanent obliteration, hence he urges the use of silk as a ligature instead of catgut.

Mr. W. H. Bennett † describes a method of treatment by ligature and excision. The operation consists in passing a ligature above and below, beneath the varicose veins, including the sheath of fascia immediately surrounding them, and then excising the intermediate portion. "The cut ends of the stumps left by the division of the varicocele are brought together and retained in permanent opposition by knotting the ends of the upper ligature to those of the lower, thus at once raising the testis to about its natural level. The ligature ends are now cut off quite short, and the operation is completed."

There is a simple plan of amputating the penis I have often employed, which was first suggested to me by Mr. Chauncy Puzey. It consists in performing a Cock's operation, so as to ensure the patient passing his urine through the perinæal wound. When this has been accomplished, and the stream of urine diverted, amputation of the penis may be performed as close to the body as possible, and the stump left to heal over by granulation. In this way the trickling of the urine from the cut extremity of the urethra over the scrotum is avoided, the patient micturating through the perinæum just as comfortably as he does after Cock's operation. It is necessary in these cases to instruct patients how to occasionally catheterise the perinæal opening so as to prevent contraction taking place. I have practised this mode of amputation with a modification, as in the following instance :—

Case.—R. D., aged 51, was admitted into the Liverpool Royal Infirmary on May 25th, 1883, suffering from epithelioma of the

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* *New York Medical Record*, Feb. 20 and Sept. 18, 1886.

† *Lancet*, Feb. 9, 1889.

penis, of nine months' duration. There was one enlarged gland in the right groin. On the 29th the membranous urethra was opened on a staff and a drainage-tube passed into the bladder through which the urine was deviated. This having been completed, and the whole of the urine passing by the perinæal wound, amputation of the penis was performed a week afterwards by lateral flaps close up to its connection with the pubes. The urethra was closed with a couple of stout catgut ligatures, just like an artery, when the flaps were adjusted over it as after an ordinary amputation. The gland in the groin was also removed. The patient left on July 25th, passing urine through the perinæal wound, the stump of the penis having soundly healed.

There are but few practitioners who do not meet with instances where persons seem to be almost demoralized by symptoms supposed to be connected with seminal discharges. It is impossible to be brought in contact with cases of this kind without being struck with the pernicious effects which are caused by the circulation of a certain kind of literature upon the minds of sensitive individuals who may be conscious of having committed some sexual indiscretion, and who are thus easily influenced. In the great majority of cases the evils portrayed, both retrospective and prospective, are as imaginary in their nature as they are wicked and deceitful in their suggestion.

By the somewhat hackneyed term "spermatorrhœa" we understand that the semen is emitted in an abnormal manner, whereby the patient's health is impaired, with the prospect of his becoming impotent. At first sight we might feel disposed to believe that this was a common derangement, if we merely took the statements of patients without due criticism. If, however, we carefully analyse the cases submitted to us as instances of spermatorrhœa, we must come to the conclusion that the disorder, in any hurtful sense, is a rare one. The reasons which are generally advanced as indicating that a person is suffering in this way are of three kinds: (1) because the urine contains evidence that the semen is voided imperceptibly in this way; (2) because after an expulsive exercise, such as defæcation, where it is presumed the seminal vesicles may be subjected to pressure, the fluid escapes in an almost pure form from the urethra; and (3) because of patients experiencing certain disordered sensations, or observing certain physical signs, which in the absence of other explanation leads them to infer that their case must be one of spermatorrhœa. Fortunately by the microscope and the test tube our methods of testing these conditions have become so precise that I cannot imagine any error arising, or there being any difficulty in drawing distinctions between what is real and what is merely presumed or suggested. That semen may be incontinently and hurtfully discharged in the two former ways I have no doubt, but that a person can suffer in this way with an entire absence of the necessary evidence is at variance with common sense. Some years ago I had much difficulty in persuading a gentleman, about thirty-five years of age, that he was not suffering from spermatorrhœa because his hair was growing prematurely grey. He conceived this notion in some way or other, and some time elapsed before he was induced to abandon the idea. Then he got married, and male twins were the first result of the union. This case impressed me with the mental demoralization the terms "spermatorrhœa" and "impotence," when adroitly and mischievously used, were capable of effecting even in those whom we may regard as not being particularly susceptible.

But what constitute the false cases of spermatorrhœa, and under what circumstances are they presented to our notice? Let me remind you of some of these by taking illustrations with which most of us are familiar. First, the discharge of a little glairy mucus from the urethra at the close of micturition or after a stool, particularly after a constipated one. As a rule, the individual takes no notice of this, as it is so slight in amount, until he accidentally gets hold of some of the literature I have referred to. Then he imagines he has spermatorrhœa, with the sure prospect of impotence, and becomes from that moment wretched and suspicious. He pulls away at his penis for the purpose of testing the amount of secretion half a dozen times a day, and succeeds in converting a natural moisture into an appreciable drop, which becomes the bane of his existence. The next person may or may not have had his mind poisoned, but one day he sees something in his urine which he thinks remarkable, if not ominous. He accordingly puts some of his urine in a glass, and discovers, after letting it stand for a little time, that a thin flocculent cloud settles down. The natural film of mucus, possibly a little in excess, is mistaken for seminal fluid. The third patient is one who has had some previous urethral trouble in the way of a chronic urethritis or gleet, and has accustomed himself to look at his urine from time to time. He sees small white thread-like bodies floating about, which he at once concludes are spermatozoa, either entire or in various degrees of mutilation. If he is not at once set right upon this point, he sooner or later gets nervous, and falls into the hands of those whose trade is to foster such delusions.

A few words will be devoted to what I would speak of as true spermatorrhœa, which may show itself by emissions provoked by the slightest or most trivial forms of sexual excitement, either with or without erection, and in the incontinent escape of the seminal fluid, either with the urine or independently, as a consequence of straining, as in defæcation. As a rule the discharge of semen under these circumstances is to be associated with an enfeebled condition of the parts rather than as the result of a general plethora. Of the contributing causes of true spermatorrhœa, there can be no doubt that those having reference to the abuse, in some form or other, of the sexual function are by far the most common. Of these I need not speak in detail.

But though spermatorrhœa may be excited in this way, the disorder is sometimes rendered difficult of cure by reason of the relaxed and over-sensitive condition of the part primarily involved—namely, the deeper portion of the urethra corresponding with the opening of the ejaculatory ducts. When this is the case some local treatment may be necessary in addition to general measures calculated to improve the nerve tone of the individual. I have sometimes found that a local astringent applied to the urethra in the form of an injection, and regularly used for some time, will permanently arrest discharges of this nature, so far as it is possible to do so. In conjunction with this treatment I have also found the administration of a moderate dose of the extract of Cannabis Indica at bed-time of service. Many cases have entirely yielded to simple management of this kind. In a few others I have resorted to the use of Lallemand's *porte caustique* to the deeper urethra with permanent advantage. This remedy must be used with great care, otherwise a sharp attack of urethritis and orchitis may supervene. In several undoubted cases of spermatorrhœa which have resisted all other kinds of treatment this proceeding has proved entirely efficacious, and I have had no occasion to regret its adoption. In connection with this subject I would take the opportunity of mentioning a case bearing upon a method of treatment which, so far as I know, is unique:—

Case.—Some few years ago a gentleman, aged thirty-five years, consulted me for a stricture. His history was briefly this: shortly after puberty he commenced to suffer from spermatorrhœa, which seemed to have severely taxed both his mental and bodily powers; for this he underwent various kinds of treatment by different surgeons, both at home and abroad, including the use of the *porte caustique*, by an eminent French specialist, but all this was to no avail. Finally, he was told that there was nothing left for him but castration. This he was loth to undergo. His experiences of urethral operations having thus become considerable, he determined to produce a stricture of the urethra, as near as he could guess, in front of the seminal orifices. For this purpose he introduced a piece of lunar caustic in the eye of a catheter about six inches down the canal; this was followed by a violent inflammation. However, a few weeks after this he had the satisfaction of finding out that a stricture was forming, which when I saw him had been in existence, as far as I could make out, for about six years. He had certainly got rid of his seminal discharges, whatever they may have been, but he now was commencing to void his urine in drops. I dilated a tight stricture for him up to a No. 7 or 8 English size, when he thanked me and disappeared. I have not since heard of him. He frequently boasted to me that he had the best of the bargain, as it was better to have a stricture than either no testes or useless ones. He was a cool, calculating individual, with a sufficient knowledge of surgery to make him dangerous, but I had no reason whatever to doubt his story.

That a stricture does not necessarily prevent that form of spermatorrhœa which shows itself in incontinent emissions is evidenced from the case of a patient referred to on page 30, who, though he had a tight stricture, frequently suffered from the presence of spermatozoa in his urine; this, however, was invariably preceded by lascivious dreams of which he was conscious.

Though least adapted to cases of seminal discharge, reference may here be made to the use of the electric light in connection with the diagnosis and treatment of various urethral disorders. The endoscope, in different forms, has now been before the profession for a considerable number of years, but until the electric light was utilised for the purpose of illuminating the specula very little could be learnt from this instrument. Now this has been altered, and by means of it the marked changes the urethra undergoes, more particularly in connection with chronic forms of urethritis or gleet, can be accurately seen. Amongst the most important contributions which have been made to the subject of electric endoscopy I would include the valuable lectures delivered in 1889, before the Royal College of Surgeons, by the late Mr. Berkeley Hill. They are largely illustrated, and may be referred to with advantage in almost all forms of urethral discharge. Mr. Hurry Fenwick's work has already been alluded to, more particularly in connection with electric cystoscopy. Though I am not disposed to attach too much importance to the use of the endoscope in connection with chronic urethral disorders, there are conditions where, as a means of applying remedies to the precise spot, it has proved of much service.

THIRTY-SIXTH LECTURE.

SOME MALFORMATIONS AFFECTING THE URINARY AND GENITAL ORGANS—CYSTOCELE—CIRCUMCISION—HYDROCELE.

IN drawing attention to some deformities met with in the genito-urinary apparatus I shall deal more particularly with the practical applications of surgery, than with the object of discussing their relations with important questions bearing upon the development of this portion of the body. Though the subject of hermaphroditism, for instance, is of much interest in connection with the latter consideration, my remarks will be confined to some points directly bearing upon its correction.

A urinous discharge from the navel is occasionally met with, and may be due to a patent condition of the urachus, a structure extending from the fundus of the bladder to the umbilicus, and retaining the tubular character of the allantois, till about the thirtieth week of fœtal life. Subsequently it becomes obliterated, and ceases at birth, except in some few instances, to have any tubular connection with the bladder. Where the patency of the tube remains the patient is to all intents the subject of a urinary fistula in a position occasioning much inconvenience. To effect a closure of this opening various means have been employed, including the application of the cautery and the vivifying of the walls of the sinus with the knife, and the introduction of sutures. As in the treatment of other urinary fistulæ, the first thing to ascertain is that there is no mechanical obstacle to the escape of urine along the natural channel; care must be taken that this is not impeded in the male by a phimosis, a contracted meatus, or a urethral calculus, which are the commoner causes of a patent urachus. In the female it has been suggested * that a condition of temporary incontinence of urine by over-dilatation of the urethra might be sufficient to bring about a cure.

Dr. Reliquet,† of Paris, has recently published a case illustrating not only a remarkable deformity, but a variety of pathological lesions involving the urinary system. The specimen is one of hydro-nephrosis of the right kidney and ureter, with calculous pyelo-nephritis of the left organ, which is much hypertrophied. It will be observed from the illustration (Fig. 153) that two large tubes proceed from the degenerated right kidney to the bladder. The outer and larger one is the dilated ureter, whilst the inner, proceeding from the apex of the kidney downwards, is a patent Müller's duct. The latter structures, it will be remembered, are the origin of the Fallopian tubes, the uterus, and part of the vagina, and are generally supposed to be reduced to the verumontanum in the male, where any trace of their persistence is rare. In Dr. Reliquet's case the remarkable clinical symptoms were no doubt due to the compression of the right ureter against the back of the bladder by Müller's duct. When putrid urine had collected in the dilated right kidney and ureter, sufficient to overcome the resistance of Müller's duct (which was also distended with fluid), it escaped into the bladder, and was voided during micturition. The bladder orifices of both ureters were patulous, and reflux of urine on the left side was no doubt the cause of the calculus pyelitis. The pressure of Müller's duct prevented this back-flow of urine along the ureter on the right side, hence the different

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* Mr. F. Cadell, *Edin. Med. Journal*, September, 1878.

† "Persistance du Canal de Müller," *Publications du Progrès Médical.* Paris, 1887.

results observed in the two kidneys. The specimen was taken from a man forty-five years of age. That the persistence of Müller's ducts may prove a serious obstacle to the passage of urine into the bladder there can be no doubt from the evi-

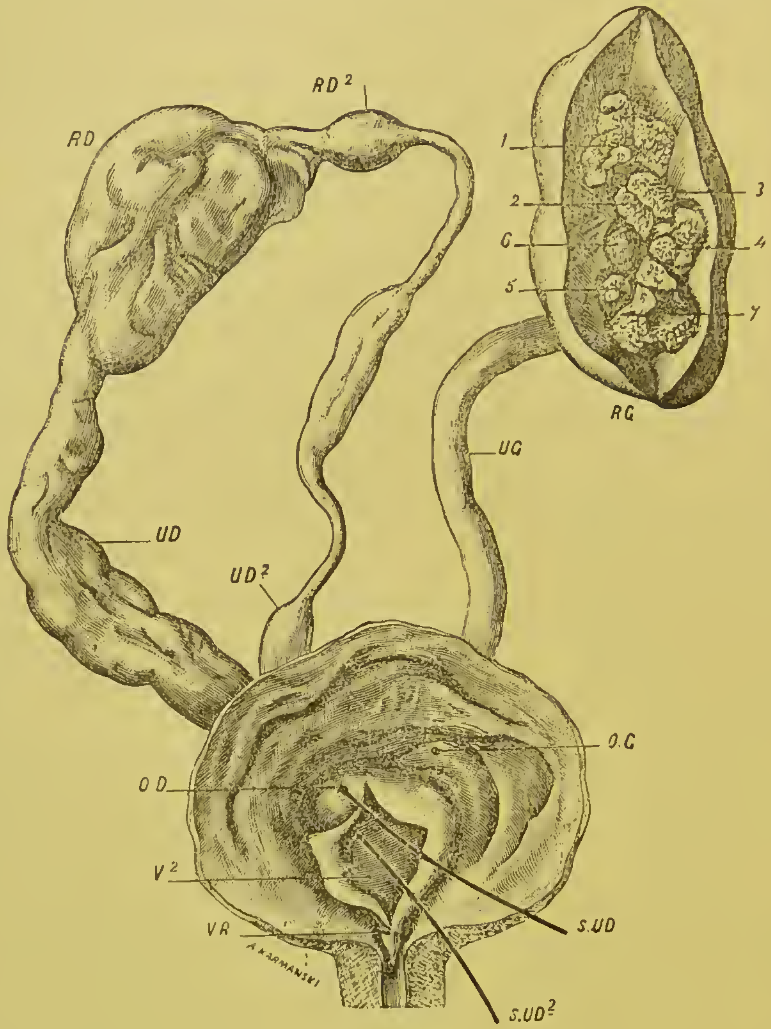

Fig. 153.*

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* R.G. Left kidney, containing calculi, marked 1–7. U.G. Left ureter. O.G. Orifice of left ureter in the bladder. R.D. Right kidney. U.D. Right ureter. O.D. Orifice of right ureter in the bladder. R.D², U.D². Upper portion of Müller's canal. U.D², V². Lower portion of Müller's canal. V.R. Verumontanum. S.U.D. Bougie in right ureter. S.U.D². Bougie in lower portion of Müller's canal.

dence afforded in this, as well as in other cases; whilst, on the other hand, such an abnormality may exist without producing symptoms, as in Dr. Ord's illustration.*

Amongst the most distressing deformities to which the human body is liable is that where the roof of the urethra is absent in conjunction with a fission and extroversion of the bladder. No more deplorable condition can be imagined, for not only does the individual, more frequently of the male kind, possess sexual desire he is unable to gratify, but the function of micturition is carried on in such a way as to be a constant source of personal distress as well as of annoyance to others. The appearance presented by the parts in the male is shown in the illustration (Fig. 154). Here not only are the parts fissured from the bladder downwards, including the symphysis pubis, but the bladder (*a*) presents the appearance of a fungating mass. The orifices of the ureters (*c*) can generally be distinctly made out by the urine dropping from them, whilst the fissured penis (*b*) projects at the base of the mass like a spout. The prostate is rudimentary. As already noticed, I can find no record of any male with this deformity who appears to have developed a large prostate. To remedy this condition various means have been employed. Of these I would mention certain plastic operations, having for their object the closing in of the protruding bladder so as to form a receptacle for the urine and a covering for the parts. To the late Mr. John Wood † we are indebted for what has been done in this direction, and a reference should be made to his papers by anyone undertaking an operation of this kind. Dr. Greig Smith,‡ of Bristol, has also recorded two cases where the operative procedure has been somewhat different, which should be noted. Various plans § have been tried, having for their object the diverting of the urine by a fistulous track into the rectum, but I do not know of any results thus obtained which would induce me to repeat these procedures. An article on this point, containing a number of experimental observations, has recently been published by Dr. R. H. Reed.* Mr. G. H. Makins † has recorded a case where, by

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* *British Medical Journal*, vol. ii., 1879, p. 697.

† *Royal Med.-Chir. Trans.*, vol. lii.

‡ *British Medical Journal*, Feb. 7, 1878.

§ By Mr. Thomas Smith, *St. Bartholomew's Hospital Reports*, vol. xv.

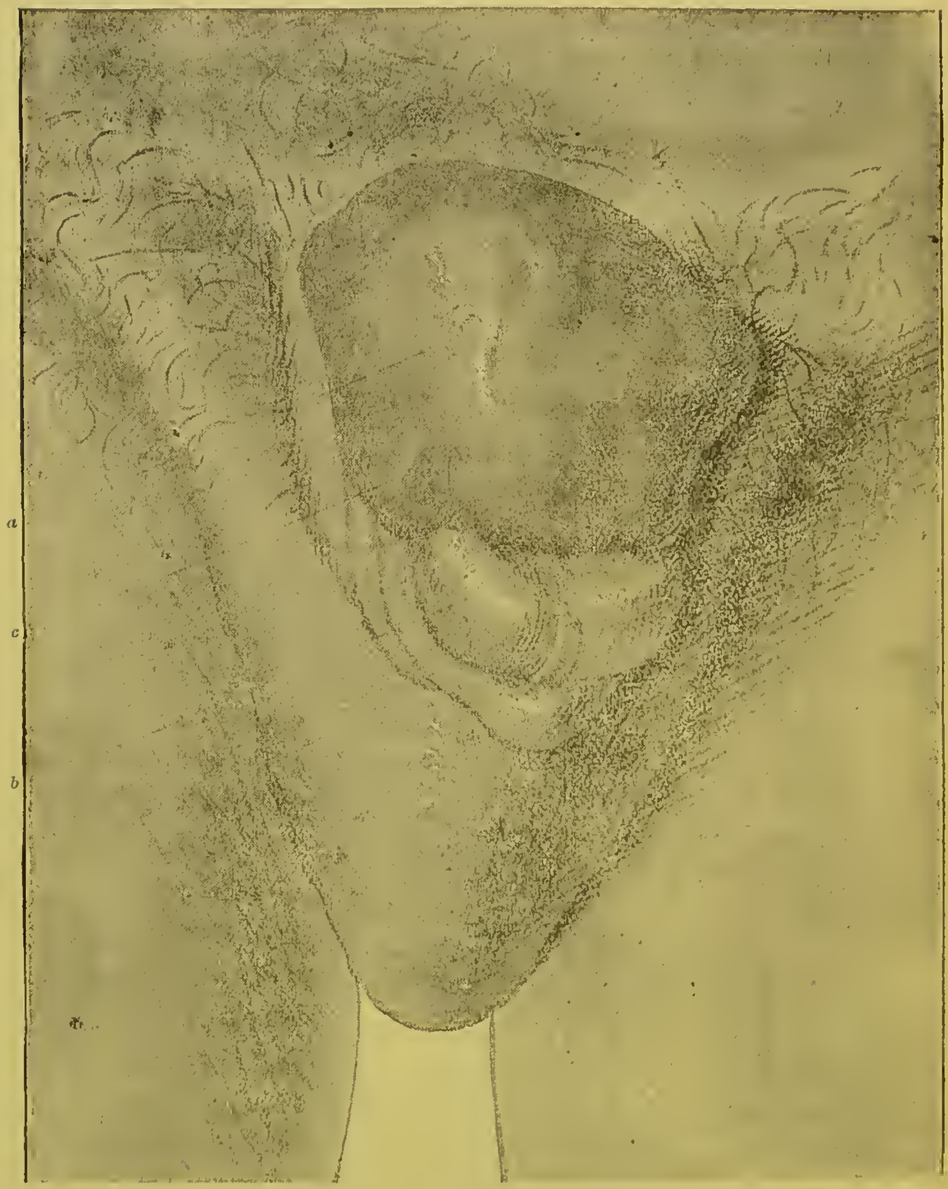

Fig. 154.

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* *Annals of Surgery*, September, 1892. † *Med.-Chir. Trans.*, vol. lxxi.

means of a preliminary division of the sacro-iliac synchondronis, he succeeded in diminishing the area above the pubes which required covering in by a subsequent plastic operation. Such a proceeding, however, can only be resorted to in early life, Professor Trendelenburg* placing the limit at five as being the most suitable age. On reviewing what has thus been done for this class of deformities, I am disposed to think that its relief will eventually work out most advantageously in the following way:—By (1) the establishment of a lumbar fistula with a kidney, preferably the right one, and (2) the removal of the opposite kidney as soon as the urinary fistula has been rendered permanent. In this way the whole of the urine would be voided through one fistula, means being taken to collect the excretion as it escapes. Dr. Gross † refers to a case mentioned by Mr. Henry Morris, "where about ten ounces of urine were passed daily into a receiver adapted to the loin, the patient suffering neither inconvenience nor discomfort." After the formation of one permanent lumbar fistula, the bladder surface being no longer saturated with urine, it would, I believe, be comparatively easy not only to close in the protruding mucous surface, but further, under these altered conditions, to make a penis out of the fissured one which might permit of the performance of the sexual act. By the establishment of a single renal fistula in accordance with such a plan, or some modification of it, as I have endeavoured to sketch out, there seems some hope of ameliorating the state of persons suffering in this way. To collect the urine as it drops from the lumbar fistula, an apparatus, such as Dr. Meyer ‡ suggests, in the shape of "a bustle" as worn by ladies, might be employed. Of mechanical appliances for the relief of the condition in question, I can speak favourably of an apparatus made by Messrs. Tiemann, of New York.

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* *Centralblatt für Chirurgie*, No. 49. December, 1885.

† *American Journal of the Medical Science*, July, 1885.

‡ *Annals of Surgery*, April, 1892.

It consists of a metallic or hard rubber shield for application over the extrophied bladder, to the lower extremity of which an elastic tube is attached leading to a bag buckled to the thigh for collecting the urine in (Fig. 155).

A case of congenital absence of the bladder is recorded by Mr. Vost, who appends the following note:—"A cavity to hold the urine could readily be made by inverting a flap from the abdominal wall; but the absence of a sphincter would make the receptacle useless. All attempt at operative procedure was therefore abandoned."*

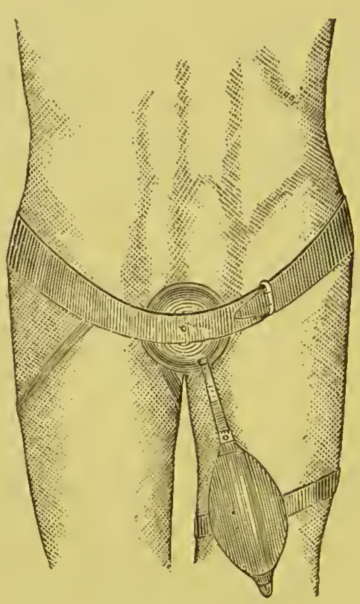

Fig. 155.

Hypospadias denotes a congenital deficiency of the lower wall of the urethra, and is of more common occurrence than epispadias. Its importance and the necessity for treatment may be regarded as relative to its extent. When the deformity consists of an absence of the frænum with a slit-like opening to represent the meatus, it causes no inconvenience, though I believe persons so affected are more liable to be inoculated with the gonorrhœal virus should they be brought in contact with it than others. An indurated chancre sometimes occupies this position, and simulates a stricture. Where the opening is at the junction of the penis with the scrotum it seems possible that the seminal fluid may fail to enter the vagina during sexual intercourse, and thus the condition of the individual resembles that where the deformity is artificially produced. It is stated in the *Australian Medical Gazette** that amongst the methods employed by some aborigines of Central Australia to prevent conception is that of opening the male urethra, and slitting it up towards the glans penis, immediately in front of the scrotum. In certain cases of urinary fistulæ with urethral stricture the semen is emitted through the false route. The following case illustrates some points in the operative treatment of hypospadias:—

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* *Lancet*, Aug. 14, 1875.

CASE.—This was a case of atresia, or imperforation of the glans in a boy, the patency of the urethra being limited to a small opening in its lower wall, one inch and a half from its proper termination. He came to me for a difficulty in urinating, and as I thought that the penis as an effective genital organ might be interfered with, I endeavoured to restore the continuation of the channel. I succeeded in doing this by introducing a probe through the small urethral opening beneath the penis, into a cul-de-sac of the canal, and then making a passage with a tenotomy knife as nearly as possible in the right direction through the glans penis. This was subsequently kept open by the use of bougies. The boy micturated through the artificial urethra I had thus made for him, and the original opening on the under surface of the penis contracted. I was arranging to close the latter by a plastic operation, when the patient left the Infirmary, considering himself well.

Where any attempt is to be made to restore the penile urethra arising out of a congenital deformity, such as a hypospadias or an epispadias, or as a consequence of some

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* *Medical Press and Circular*, May 30, 1883.

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ulceration or laceration, I am satisfied, from some experience of these operations, that the first principle of treatment is the temporary deviation of the urine through the perinæum, until such time as the plastic operation is soundly healed. Unless an external perinæal urethrotomy for urine drainage precede such attempts to repair, disappointment is tolerably sure to follow.

In some hypospadiacs there is a fission of the prepuce below and a redundance above, the part being disposed like a veil over the glans penis. The following case, where the foreskin was scanty and caused some tension, is of some interest :—

CASE.—It was that of a patient with a slight hypospadias. He had been married six months without signs of family, and was in doubt as to whether his malformation was in any way responsible. His grounds of complaint were that the urine scattered and was not projected in a stream, and that intercourse was painful by the tightness of a fold of skin beneath his meatus, which proceeded on either side to form a very limited prepuce. As it seemed that this bridle was the source of inconvenience I divided it, with permanent advantage.

A congenital occlusion of the orifice of the urethra is occasionally met with in new-born males, and two instances of this deformity, occurring in hypospadiacs, are referred to by Dr. James Adams.* In one of these cases the obstruction was of a membranous nature and was penetrated by means of a small French catheter after an ordinary probe had failed. There was no further trouble. Where the obstruction is of a more extensive nature temporary relief may, as Dr. Adams suggests, be afforded by a supra-pubic puncture, followed by catheterism from the bladder side, and incision on the point or track of the instrument as described on page 61.

Dr. Rabagliati † records an instance where hypospadias in a female aged twenty-four, causing incontinence of urine, was cured by paring the edges of the fistula and uniting them by chromic gut sutures. The case further points to the importance of investigating all cases of congenital incontinence of urine by ocular inspection of the parts.

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* *British Medical Journal*, Jan. 31, 1891.

† *Ibid.*, Sept. 17, 1887.

A contraction of the urinary meatus, whether congenital or acquired, as by the healing of an ulcer in this position, is sometimes a cause of much inconvenience. When persons so formed contract gonorrhœa the narrow orifice of the urethra often retards recovery by confining moisture and interfering with the natural drainage of the urethral excretions. The removal of the contraction by division or dilatation is often speedily followed by the disappearance of discharges which previously had resisted all kinds of treatment. Such a contraction is sometimes an annoyance by confining urine within the canal, which, by escaping after micturition is finished, soils and wets the clothing.

There is a state of the penis which, though not a deformity in the congenital sense, may be acquired. I refer to a thickening and contraction of the suspensory ligament not unlike that which is seen in the hand in middle-aged gouty rheumatic men. When the organ is erect, pain and inconvenience are occasioned by the dorsal curvature assumed, which renders connection almost impossible. In addition to the general treatment appropriate to the condition upon which these contractions depend, I have in one or two instances found benefit from the application to the part of an ointment in which the constituents are mercury and belladonna in varying proportions.

Congenital communications between the intestines and urine passages are not of common occurrence. Mr. F. Page* reports a case where from such a deformity a man, aged fifty-four years, passed his fæces and urine by the urethra all his life. The patient stated that he had been in the habit of taking aperient medicine daily, and squeezing the fæces through a fistula which had been formed by incision into the urethra immediately in front of the scrotum. The man had been married and was the father of one child. By reason of the contraction of the fistula it was found necessary to enlarge it and to stitch the mucous membrane to the skin. This made him more comfortable than he had ever previously been.

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* *British Medical Journal*, Oct. 20, 1888.

Though I have not met with an instance in my own practice, there is a deformity in the female where the bladder becomes inverted, or turned inside out, and protrudes between the labia as a vascular mass (Fig. 156). In the case from which this illustration was taken* the patient narrowly escaped the application of a ligature to the protrusion on the supposition that it was a nævus or vascular growth. Fortunately Mr. Crosse was able to prevent the adoption of such a fatal course; for, as he remarks, "had a ligature been efficiently applied to the neck of the tumour, as

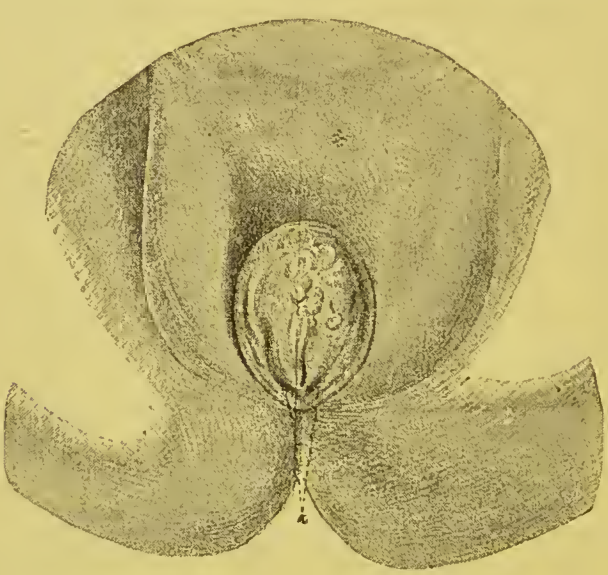

Fig. 156.

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* "On the Inverted Displacement of the Urinary Bladder," by J. G. Crosse.—*Trans. Prov. Med. and Surg. Assoc.*, New Series, vol. ii.

was contemplated, the bladder would have been removed, including all its coverings, the ureters cut through just above their terminating orifices, and the peritonæal cavity largely opened." On examining this tumour, it was found capable of being reduced, like a hernia, by the pressure of the finger. When reduction was thus accomplished, a passage remained through which the tumour on retiring had taken its course, and which proved to be the dilated urethra. This reduction appears to have been effectual, for Mr. Crosse remarks: "During the short time that the patient remained under my notice there was no relapse, and I am enabled to add that she is still living, after an interval of sixteen years, and is a healthy young woman, save only the affliction of incontinence of urine, with which she has been constantly troubled, but without any relapse of the vesical displacement." Mr. Crosse concludes his paper with the following passage bearing upon diagnosis: "Protrusions of the relaxed lining membrane of the bladder *into* and *even through* the urethra, and vascular growths taking the same course, are not very unfrequent, as every surgeon of experience knows, but these are very different from the inversion and prolapse of the entire bladder through the urethra in female children—a fact which, however rare, ought henceforth to be regarded as satisfactorily ascertained."

Cystocele, or hernia of the bladder, is not commonly met with. Instances will be found recorded where the exploration of swellings and prominences in the region of the pubes, groins, and perinæum has proved them to be urine cavities, formed by hernial displacements of the bladder. The following case illustrates some of the points in the diagnosis and management of this class of abnormalities:—

Case.—A single lady, aged about forty, was referred to me by Dr. A. Waters in 1883, suffering from a swelling in the right groin, for which an instrument-maker had some time previously applied a truss. Though there was some swelling below

Poupart's ligament, I could detect no impulse on coughing, nor did the tumour decrease on the patient's lying down. On exercising pressure over the swelling, pain was referred to the pudendum. She complained that the passing of urine had not been so free or so comfortable as formerly. I passed a long catheter into the bladder, and having emptied it, the instrument could be pressed in up to the hilt. Then, on pressing over the tumour with the fingers, a considerable amount of urine could be made to flow. Pressure over the swelling after it had been emptied with the catheter diminished its bulk. The urine was neutral and contained phosphates. As there was no doubt the patient was suffering from a hernia of the bladder, she was ordered to wear an elastic spica bandage over the groin, which I afterwards heard gave permanent relief. The symptoms seemed to point to an actual hernia of the bladder rather than to sacculation, though I could see, from the examination of this and other cases, that it is not always easy to draw a distinction.

Vaginal cystoceles represent the most frequent form of the disorder, and most commonly occur in women who have borne many children.

The operation of circumcision, though not always undertaken for a deformed condition of the prepuce, may be briefly referred to. How it happened that this ordinance should be decreed, for what at first sight would seem to be an imperfection in creation, is an inquiry foreign to this purpose; suffice it to remark that the removal of a portion of the foreskin appears to be a wise precaution under certain circumstances.* From a clinical point of view, circumcision is to be recommended in cases where the orifice of the prepuce is so contracted as not to permit of the glans penis being readily uncovered. In some persons the degree of contraction is so extreme as barely to permit the introduction of a fine probe, and thus micturition is almost as much interfered with as if there were a stricture of the meatus of the urethra. The straining to urinate thus caused has, in children particularly, led to the formation of a hernia. Further, a tight prepuce not unfrequently causes that painful condition of the parts known as a paraphimosis. To remedy this it is the practice of some surgeons to slit up the prepuce on a director, but I do not think it is a good plan, as angles are left which sometimes prove inconvenient. A phimosis, by retaining secretions, subjects the person to balanitis, herpes, and excoriations; and further, a redundant foreskin furnishes a convenient receptacle for inoculable virus. Mr. Hutchinson has shown that the circumcised Jew is less liable to contract syphilis than the uncircumcised Gentile. "No one," he remarks, "who is acquainted with the effect of circumcision in rendering the delicate mucous membrane of the glans hard and skin-like will be at a loss for the explanation of this." * And what is true of syphilis is equally so of other diseases capable of being spread by contagion or roused by irritation. It is rare to meet with cases of cancer of the penis in persons who have always lived with the glans uncovered. A foreskin may be so tight and contracted as to interfere with the development of the glans penis within it, and I have met with instances in children where circumcision was necessary to permit of the growth of the glandular portion of the organ. Circumcision is sometimes required for removing a cause of reflex irritation, as, for instance, in children where nocturnal incontinence of urine is provoked by an elongated prepuce, and cured by its removal. Professor Sayre † has shown how such an abnormal condition of the foreskin is the cause of reflex pains and disordered movements, which, in the absence of the proper explanation, have been regarded as indicative of hip-joint disease. Dilatation of the prepuce is occasionally recommended where the patient is strumous, or is a

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* *The History of Circumcision from the Earliest Times to the Present*, by Dr. P. C. Remondino, is a work of much interest. F. A. Davis, Philadelphia, 1891.

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* *Medical Times and Gazette*, Dec. 1, 1855.

† *Trans. Ninth International Medical Congress*, vol. iii.

"bleeder," and it is desirable to avoid making an incision. For this purpose such an instrument as the one described by Mr. R. W. Parker will be found suitable.*

I have met with two kinds of stricture of the urethra resulting from circumcisions which have not turned out well, and as they indicate the necessity of certain precautions being taken, I will now refer to them. In two instances of the first form of stricture the extremity of the glans penis, including the meatus, was wounded in making the section of the prepuce. In one the division had been made without the use of forceps or other contrivance to include the foreskin and secure retraction of the glans behind the line of section, the operator having contented himself with merely holding the portion to be removed between the finger and thumb, and then making the division. This is a hazardous mode of proceeding. In the other case, where the glans had been wounded, there appears to have been considerable œdema of the prepuce, and consequently difficulty, in its swollen condition, of determining the precise position of the glans within it. Amputation of the prepuce had been performed, and the ends of the glans included. Under such circumstances it would have been better first to slit up the prepuce with a probe-pointed bistoury, and, after having exposed the glans, to complete the operation with a pair of scissors. The second variety of stricture was caused by the prepuce being divided too high up, or, what amounts to the same thing, being drawn down too much over the glans penis before being included in the forceps for the purpose of making the necessary section. On bringing together the parts with sutures, the tension on them was so great as to cause ulceration, and to leave behind a broad cicatrix capable of exercising a contractile pressure on the under surface of the urethra, sufficient to impede micturition, and to cause other discomfort.

* *British Medical Journal*, July 19, 1879.

In circumcising a patient, care should be taken to separate or to break down adhesions between the glans and the prepuce. They are generally caused by previous attacks of balanitis, and are sometimes so firm that some force has to be exercised. In certain cases of suspected ulceration of the glans penis, where retraction cannot be practised, it is proper either to circumcise or to slit up the prepuce, for the purpose of ascertaining the nature and extent of the disease, which is sometimes considerable. In recent cases of syphilis and chancroid the cut surfaces may thus become inoculated with the virus and the specific ulceration added to; but this is a matter of little consequence as compared with the damage to the penis, as well as to the urethra, that may be done by a progressive sore which cannot be seen and properly treated. The state of the frænum also requires consideration. Where it is lax it is better, after circumcision, not to divide it, as it is generally found to adapt itself to the altered relations of the parts. When in the flaccid condition of the penis it is so tense as to be on the stretch, or to depress the extremity of the organ, it is well, in the adult, to divide it, otherwise the patient may incur a risk of rupturing it. On section, a small artery usually spouts freely, and requires either twisting or a ligature. In some subjects serious hæmorrhage from rupture of the frænum has occurred. The frænum, when undermined by ulceration, may usually be divided without causing bleeding by first blanching it by a touch with nitric acid before the scissors are applied. A chronic suppuration within an elongated prepuce is a source of infection to the urethra above; at all events, I have known instances where gleets did not get well until the purulent bag of the foreskin was removed by circumcision.

The treatment of hydrocele when associated with a tubercular testicle may be illustrated by the case of a patient who has recently been under observation. Some weeks ago I tapped him for hydrocele of considerable size, where before doing so it was impossible to form an opinion from the history of the case, as to the condition of the testis or epididymis, whatever the anticipations may have been. Several ounces of clear hydrocele fluid being withdrawn by means of a trocar, the testis was found distinctly tubercular. With this condition I cannot say that I am in favour of injecting iodine or any similar irritant. If, on the other hand, nothing further is done, fluid is again poured out into the tunica vaginalis for the purpose of protecting the somewhat roughened and tender testis, and the inconvenience of a large scrotal mass is continued. I have had some very good and permanent results in cases of this kind by opening the sac by a free vertical incision, and then draining the cavity for some days by a drainage-tube. By this means I believe the cavity of the tunic may be obliterated, and a further collection of fluid prevented. Where the tubercular deposits are in the course of softening down I am of opinion that the wisest course is at once to remove the testis. If left under such conditions infection of more vital portions of the urinary apparatus, as high as the kidneys, is, in most instances, merely a matter of time. There is much to be said in opening the tunic where the state of the testicle is at all doubtful. Under ordinary circumstances there is no better method of treating hydrocele than by tapping and injecting with about two drachms of the tincture of iodine, as prepared according to the Edinburgh Pharmacopœia. It is not, however, applicable to all conditions of the testicle or the tunic.

The mode of removing the testicle is shown by the following case:—

Case.—The patient, aged 32, came to the hospital on May 1st, 1893, with his right testicle riddled by suppuration of many months' standing, which proceeded, as far as can be ascertained by the history, from a broken-down syphilitic gumma. As his general health was evidently failing from the long-continued discharge, I removed the testis, and the wound is now healed.

Treatment by iodide of potassium is still being continued, having regard to the origin of the disorder, though no indications of syphilis are now to be observed. After removal it was pointed out that the normal structure had entirely disappeared, and the organ was beyond repair, and must have been useless. In removing it I did not include the cord in the ligature, but merely tied the three arteries within it with fine catgut. Where the whole cord is included in a ligature, which is sometimes done, the pain afterwards is often very severe and continuous.

Sufficient time has already elapsed in this instance as to endorse two points which are frequently observed in connection with the removal of one testicle. First, that the sexual function is by no means impaired by the loss of one organ; and secondly, that the remaining gland undergoes some degree of hypertrophy or enlargement, which no doubt fits it for the additional work of secretion that becomes necessary.

As the last page of this work is passing through the press, an important paper* on the relations between the bladder and ureters is published by Professor L. Lewin and Dr. H. Goldschmidt, of Berlin. Reference is made to it here in confirmation of my remarks on page 364 relative to the possibility of influencing the movements of calculi within the pelvis of the kidney by the injection of water or any suitable fluid into the bladder. From experiments I have published,† and the results obtained therefrom, there can be no doubt, as stated in the paper by Drs. Lewin and Goldschmidt, "that there is a backward flow of the bladder contents ensuing on injections, or on artificial retention, provided that the bladder is active and capable of contraction, its muscle not being over-stretched," and thus the descent of small calculi, which if allowed to remain within the pelvis of the kidney must necessarily increase in size, may be favoured. The paper is one of much interest, more especially in connection with the early treatment of impacted calculi of the kidney.

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* *Lancet*, Aug. 12, 1893. † *Ibid.*, March 10, 1888.

APPENDIX.

As this edition is largely based on my other Works and Papers which have preceded it, for convenience of reference a list of these is appended :—

PUBLICATIONS.

The Prevention of Stricture and Prostatic Obstruction. Churchill, 1881.

Observations on Lithotomy and Lithotrity and the early detection of Stone in the Bladder, with a Description of a New Method of Tapping the Bladder. Churchill, 1883.

Lectures on the Surgical Disorders of the Urinary Organs. Churchill; First Edition, 1878; Second Edition, 1880; Third Edition, 1887.

The Lettsomian Lectures, delivered before the Medical Society of London, "On some points in the Surgery of the Urinary Organs." Churchill, 1888.

Injuries and Diseases of the Bladder and Prostate. Ashhurst's *Encyclopædia of Surgery* (American). W. Wood & Co., New York, 1887.

Address on some recent Advances in the Surgery of the Urinary Organs. British Medical Association, Annual Meeting. Churchill, 1883.

The Articles on Genito-Urinary Surgery in the *Year-Book of Treatment* from 1884 to 1893. Cassell & Co.

Six Lectures at St. Peter's Hospital on some Urinary Disorders (reprinted from *Medical Press and Circular*). Ballière, 1890.

The Lancet—

Pneumatic Aspiration for Retention of Urine. 1874.

Extraction, with the Lithotrite, of a Pencil-case from the Bladder. 1877.

The Lancet (continued)—

On the Local Treatment of some Bladder Affections, with the Description of a Pessary Catheter. 1878.

On the Management of Patients with Prostatic Enlargement. 1879.

Clinical Lecture on Lithotomy. 1879.

On the Treatment of Gleet and the Prevention of Stricture by Irrigation of the Urethra. 1880.

On the Enucleation of Prostatic Tumours. 1881.

On the Radical Cure of Varicocele. 1882.

Urinary Tuberculosis. 1882.

Filiform Bougies. 1883.

Catheter Fever. 1883.

Prostatic Gout. 1883.

On some points in the Treatment of Urinary Abscess, Stricture, and Extravasation of Urine. 1883.

A Study on the Dead Subject, relative to Catheterism of the Ureters and Exploration of the Male Bladder. 1884.

Perinæal Urethrotomy as an antecedent to Amputation of the Penis by Lateral Flaps and Occlusion of the Urethra. 1884.

A case of Fractured Pelvis and Ruptured Bladder, in which Median Cystotomy was performed. 1884.

Clinical Lecture on a case of removal of Scirrhus Cancer of the Prostate. 1884.

Villous Tumour of the Bladder—Removal. 1884.

The After-treatment of Lithotomy where the Bladder is Pouched or Sacculated. 1884.

Lithotomy in a case where the Nucleus of a Stone was the mouthpiece of a tobacco-pipe. 1885.

On some of the Surgical Aspects of Renal Tuberculosis. 1885.

Case of Villous Tumour of the Bladder, with operation. 1885.

Dislocation and Fracture of the Spine, involving the Bladder with complete recovery. 1885.

On the Treatment of some Chronic Forms of Suppuration of the Male Uretha. 1885.

On the Palliative and Radical Treatment of the Obstructing Prostate. 1886.

The Lancet (continued)—

On the Causation and Nature of Hypertrophy of the Prostate. 1886.

Supra-pubic *versus* Perinæal Lithotomy. 1886.

On Suction in the removal of Foreign Bodies from the Bladder. 1887.

On the possibility and utility of washing out the pelvis of the Kidneys and the Ureters through the Bladder. 1888.

Remarks on Endoscopy with the Electric Light. 1888.

The Pathology and Treatment of the Enlarged Prostate (Post-Graduate Lecture). 1888.

Clinical Remarks on the Treatment of Tight Strictures. 1888.

Perinæal Lithotrity. 1888.

Description of some cases of Bilharzia Hæmatobia complicated with Cancer affecting the Urinary Organs. 1889.

The Treatment of Suppurating Kidneys by Perinæal Puncture and Drainage. 1889.

On the use of Petersen's Bag as an aid in Sounding for Stone and in Lithotrity where the Bladder is pouched or sacculated. 1891.

On Guyon's method of evacuating *débris* after Lithotrity. 1892.

British Medical Journal—

The Endoscope in Diseases of the Urethra. 1868.

On the Treatment of Stricture of the Urethra by Stretching. 1881.

On Tapping the Bladder from the Perinæum through the Hypertrophied Prostate. 1881 and 1882.

Case of Litholapaxy. 1882.

Cystotomy by a modified Lateral Method. 1883.

On the Treatment of Urethral Stricture by combined Internal and External Urethrotomy. 1885.

Introduction to a Discussion on the Diagnosis and Treatment of Tumours of the Bladder. 1885.

A case where Lithotomy was twice performed within fourteen months, with remarks on the Recurrence of Stone. 1886.

The Fibromatous Prostate. 1889.

British Medical Journal (continued)—

Incontinence of Urine coincident with an arrest in the Development of the Prostate. 1889.

Some cases in Practice bearing upon the Function of the Prostate. 1889.

On the selection and use of Catheters and other instruments for Enlarged Prostate. 1890.

On the Restoration of the Function of Micturition. 1893.

Medical Times and Gazette—

Acute Prostatitis. 1881.

Liverpool Medical Journal—

On Fissure of the Vesical Orifice. 1882.

Notes on the Surgical Treatment of Hæmaturia. 1884.

A case where a piece of a Rabbit's Bone passed from the Intestines into the Bladder. 1884.

Observations on some changes in form of the Prostate and Floor of the Bladder. 1885.

On Toxic Urine in relation to certain Surgical Operations on the Urinary Organs. 1886.

Notes on the Surgery of the Kidney. 1889.

Provincial Medical Journal—

The Treatment of Stone in the Bladder in Female Children. 1885.

The Diagnosis and Treatment of Tumours of the Bladder. 1885.

On Tunneling the Large Prostate. 1886.

Notes on Out-Patient Practice at St. Peter's Hospital. 1893.

Medical Press and Circular—

The Pathology and Surgery of Urinary Abscess and Extravasation of Urine. 1888.

The Treatment of some Urethral Strictures by Section and Drainage. 1889.

On some External Urinary Fistulæ. 1893.

Annals of Surgery—

Further Observations on the Treatment of Stone in the Bladder. 1885.

Clinical Journal—

Clinical Remarks at St. Peter's Hospital. 1892 and 1893.

Liverpool and Manchester Medical and Surgical Reports—

On Peri-Urethral Abscess and Extravasation of Urine. 1876.

New York Medical Journal—

Abstract of a Lecture on Perinæal Prostatotomy at Bellevue Hospital. 1888.

Transactions of International Medical Congresses—

Bigelow's Operation for Stone in the Bladder. London, 1881.

The Treatment of Prostatic Obstruction by Section of the Gland. Copenhagen, 1884.

Transactions of the Congress of Physicians and Surgeons, Washington, U.S.A.—

Perinæal Lithotrity. 1888.

Transactions of the French Surgical Congress—

On the Causes of some forms of Urinary Fever. Paris, 1892.

Transactions of the Royal Medical and Chirurgical Society of London—

A case of Lithotomy where a portion of the Prostate was also successfully removed. Vol. lxv.

Transactions of the Medical Society of London—

Some cases in which a Non-Malignant Communication existed between the Bladder and Intestines. Vol. xiv.

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